ICE AND Refrigeration

PUBLISHED BY NICKERSON & COLLINS CO., CHICAGO - NEW YORK

58th YEAR ★ JULY, 1949

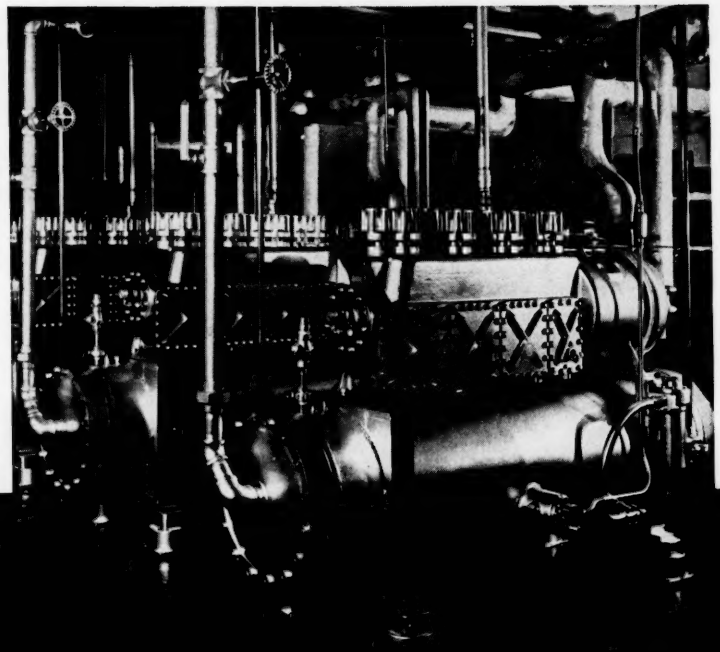


Photo Courtesy Westinghouse Electric Corp.

Get Full Refrigerating Efficiency

Keep the entire system clean with Texaco Capella Oils

LUBRICATE your refrigerating compressors with *Texaco Capella Oils*. They keep systems clean—assuring maximum refrigeration tonnage at lowest possible cost.

Texaco Capella Oils are highly refined, moisture-free oils that do not react with refrigerants. They have very low pour tests, and strongly resist formation of carbon, gum and sludge. They prolong compressor life, reduce maintenance costs . . . assure full refrigerating efficiency.

There are suitable viscosities of *Texaco Capella Oils* for compressors of every size and type . . . and a Texaco Lubrication Engineer will gladly help you select the oils you need for peak compressor performance.

Call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Capella Oils

FOR ALL AIR CONDITIONING AND REFRIGERATING EQUIPMENT

ICE AND REFRIGERATION, Nickerson & Collins Co., Publishers, 433-435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 117, No. 1, July, 1949. Entered as second-class matter August 8, 1891, Chicago, Ill., under the Act of March 3, 1879. Additional entry at Beloit, Wis., April 20, 1948. Copyright 1949. Subscription in the U. S. $3.00 per year; other countries $4.00.

Say, Materials Handling Engineers

Moto-Trucs—First in the industry, First in developments.

SHORTER LENGTH

Moto-Trucs are up to 15" shorter than other makes of motorized hand trucks. Moto-Trucs do the work of larger equipment safely and efficiently in spaces and on floors where it is difficult or impossible to operate larger trucks.

EASIER OPERATION

Moto-Trucs have a roller type control handle, giving two speeds forward and two reverse by a slight movement of hand in direction of travel, and operate at any position of steering handle.

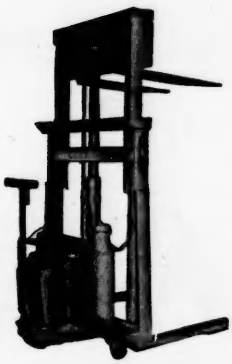
SAFETY FEATURES

Safety dead man controls, with brake applied in the raised or lowered position of steering handle, insure better maneuverability and safety to the operator.

LOW MAINTENANCE

Moto-Trucs are ruggedly built and all operating parts are accessible for quick inspection.

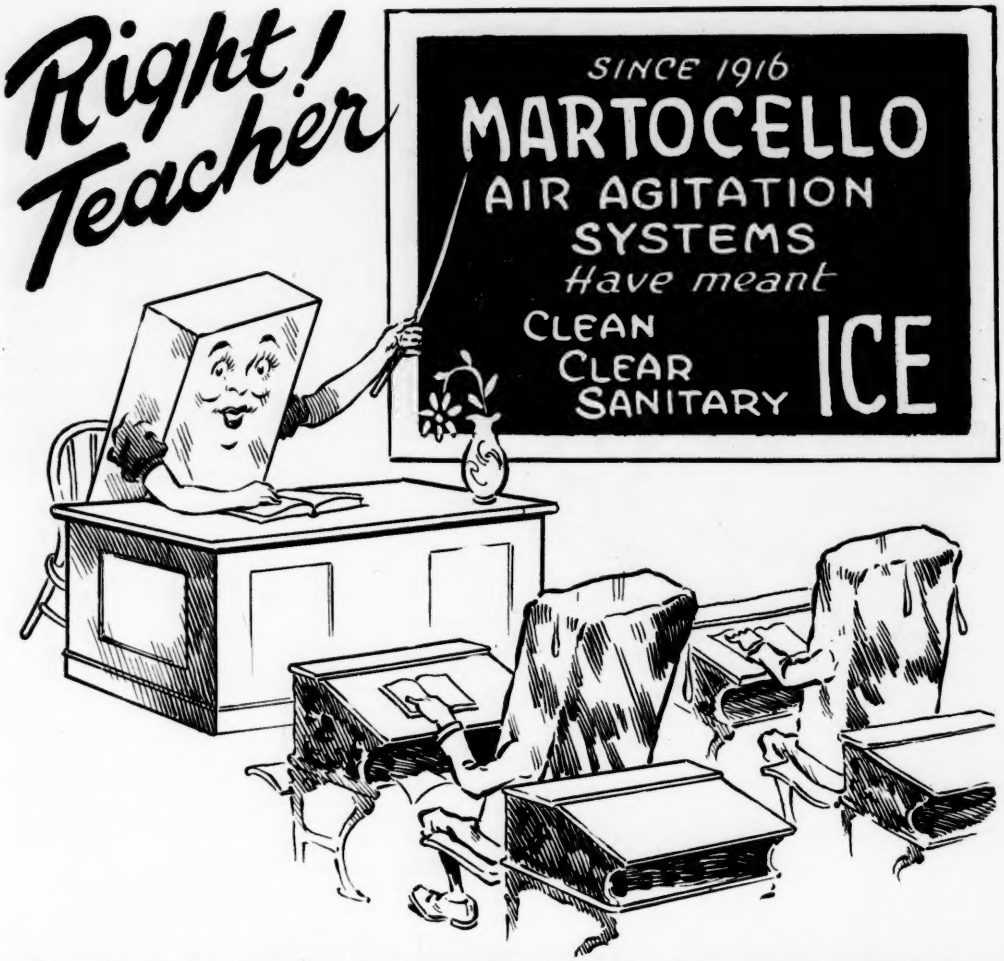
Read all about Moto-Trucs, see them in action, compare them with other makes. They are imitated but never equalled in design or stability. WRITE FOR BULLETIN No. 49.



MOTO-TELESCOPIC HI-LIFT TRUCK

3,000 lb. capacity. 80" lift, fully extended. 66" collapsed position. Operates in 6 ft. aisle with a 36"x48" pallet. Made to handle any type and size of pallet.

Right! Teacher



MARTOCELLO CLEAR RAW WATER AIR AGITATION SYSTEMS

• *Dependable* • *Efficient* • *Simple* •

Experience IS THE BEST TEACHER!

THE ICE CUBE WITH A FUTURE

Yes, you are assured of "QUALITY ICE" when using MARTOCELLO AIR SYSTEMS. Quality products that guarantee top performance, but yet are the most economical on the market!

LET US SUPPLY YOUR REQUIREMENTS and be convinced—

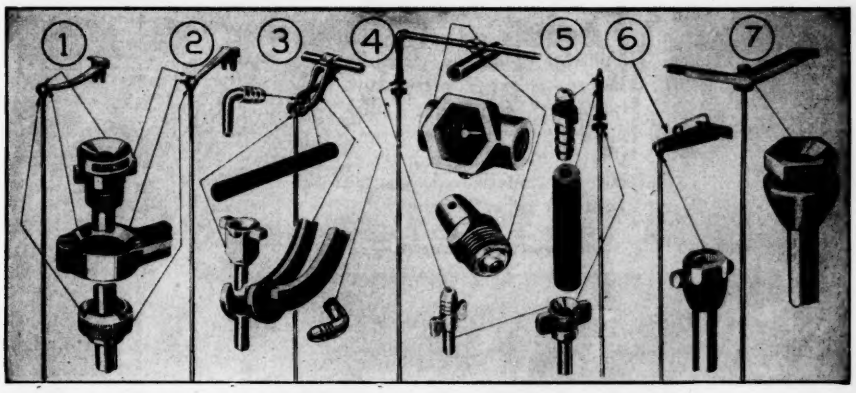
MARTOCELLO AIR SYSTEMS HAVE NO EQUAL

A GOOD LESSON IN ICE MAKING

Martocello's

AIR AGITATION SYSTEMS
BRING YOU THE FINEST
CLEAREST ICE EVER!

7 Different Systems



- MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Offset Form
- MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Straight Form
- MARTOCELLO SERIES DROP TUBE BRACKET
- DOUBLE BRACKET SYSTEM ASSEMBLY
- SERIES DROP TUBE ASSEMBLY
- GALVANIZED STEEL TRUNNION TYPE BRACKET ASSEMBLY
- GALVANIZED STEEL SADDLE BRACKET ASSEMBLY

FOR PROMPT EFFICIENT SERVICE — PHONE, WIRE OR WRITE TODAY!

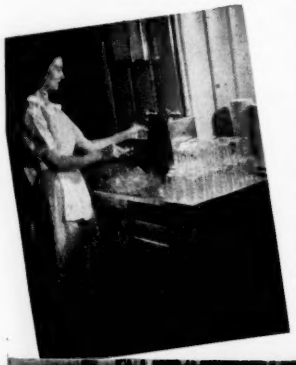
Represented on the West Coast by Western Ice Equipment Co., 420 Market St., San Francisco, Calif.

Jos. A. Martocello & Co. 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

"Serving the Ice Industry Since 1916"... "There is no Substitute for MARTOCELLO QUALITY"

Select THE Vogt Automatic TUBE-ICE MACHINE

FIRST: Because it produces Vogtice, the novel ready-sized ice, untouched by human hands to meet the highest standards of cleanliness expected by guests and required by most local health authorities for beverage cooling and food refrigeration.



SECOND: Because the Tube-Ice Machine occupies less space, requires less plant, uses less power, operates automatically without labor and thereby makes ice at a lower cost per ton than is possible with any other system.

Photos courtesy of Brown Hotel, Louisville, Ky.

HENRY VOGT MACHINE CO., INC., LOUISVILLE 10, KY.

BRANCH OFFICES:
NEW YORK, CHICAGO, DALLAS, PHILADELPHIA, ST. LOUIS, CLEVELAND

...AND CLUBS

TERRACE PLAZA HOTEL
Cincinnati, Ohio

STATLER HOTEL
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STATLER HOTEL
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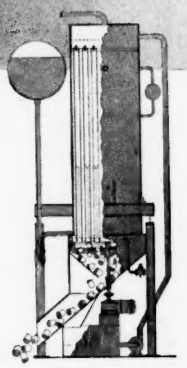
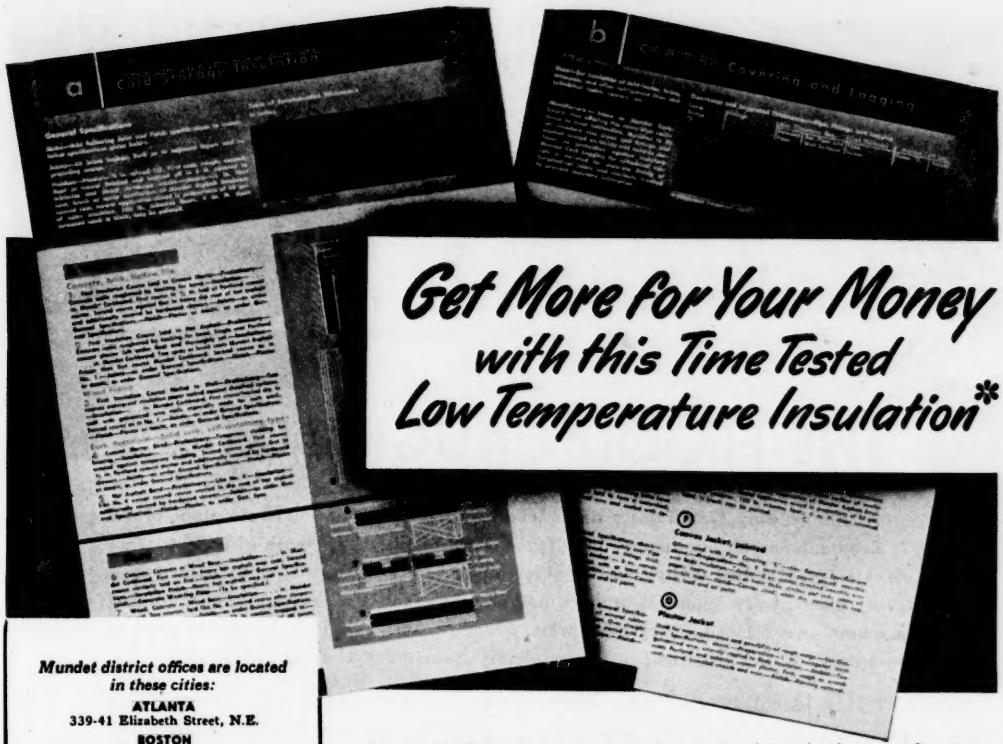


Vogtice, frozen inside tubes of small diameter, is a clear hard ice of superior quality. Either cylinder or crushed ice may be had from the same freezer by simple adjustment. A bulletin containing general information on the Tube-Ice Machine will be sent upon request.



Get More for Your Money with this Time Tested Low Temperature Insulation*

Mundet Corkboard is a time-proved heat and moisture barrier . . . serving at top-efficiency in hundreds of quick freezing and frozen food locker plants, in cold storage rooms and food processing plants. Whether you have small or large facilities for low temperature, you need Mundet Corkboard for these dollar-saving advantages:

LOW CONDUCTIVITY Mundet Corkboard provides the most efficient barrier to heat transfer due to its internal cellular structure of sealed dead-air spaces.

STRUCTURAL STABILITY The cellular structure of Mundet Corkboard maintains its shape and characteristics under rigorous conditions of service.

NON-ABSORBENCE Mundet Corkboard has no capillary attraction. This nature-made quality avoids absorption of dampness and odors. There is no swelling or loss of insulating value from moisture infiltration.

EASE OF INSTALLATION Mundet Corkboard is light in weight despite its strength. It cuts easily, readily holds nails or skewers; bonds with cement, asphalt or paint.

LONG-LIFE There is only one way to figure insulation cost. That is the over-all 'life-expectancy' of the material. Here, again, Corkboard is the choice, with thousands of installations to prove its durable service.

The best insulation requires competent installation. You benefit from the experienced erecting services that are offered by Mundet branch offices. Corkboard is available for prompt shipment from nearby warehouses. Send coupon for copy of Mundet Cork Manual. Prepared in convenient filing size, with cork specification data.

Mundet district offices are located in these cities:

ATLANTA
339-41 Elizabeth Street, N.E.

BOSTON
57 Regent St., North Cambridge 40

CHARLOTTE, N. C.
206 E. Stonewall St.

CHICAGO 16
2601 Cottage Grove Avenue

CINCINNATI 2
427 West 4th Street

DALLAS 10
601 Second Ave.

DETROIT 21
14401 Prairie Street

HOUSTON 1
Commerce and Palmer Streets

INDIANAPOLIS
15 E. Washington St.

JACKSONVILLE 6, FLA.
800 E. Bay St.

KANSAS CITY 7, MO.
1428 St. Louis Avenue

LOS ANGELES
(Maywood)
6116 Walker Avenue

NEW ORLEANS 16
315-25 N. Front Street

PHILADELPHIA 39
856 N. 48th Street

ST. LOUIS 4
2415 South Third Street

SAN FRANCISCO 7
440 Brannan Street

In Canada:
Mundet Cork & Insulation, Ltd.
35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

MUNDET
CORK INSULATION

IR7

MUNDET CORK CORPORATION
Insulation Division
7101 Tonnelle Ave., North Bergen, N. J.

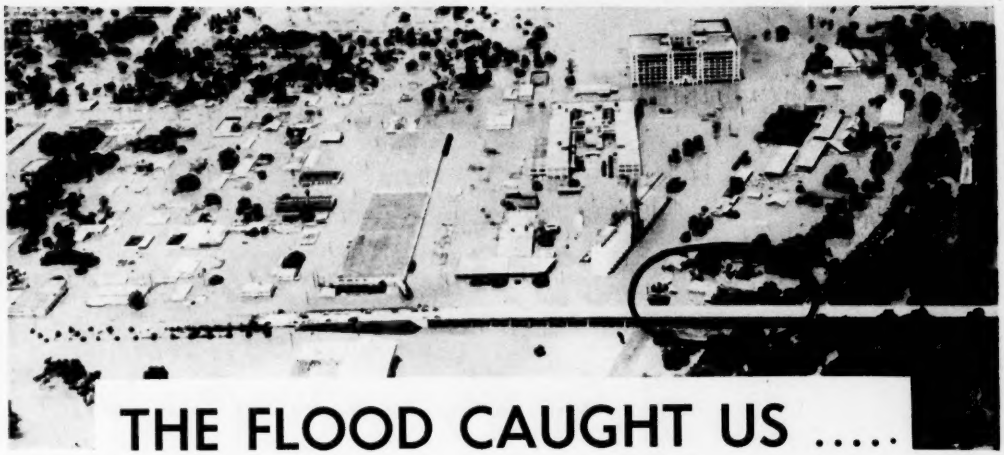
* *Please send copy of Mundet Cork Insulation Catalog in handy reference size.*

Name.....

Company.....

Address.....

City.....*Zone*.....*State*.....



THE FLOOD CAUGHT US .....

Tuesday, May 17, a Trinity River levee, immediately adjacent to our plant, broke. A flood submerged our factory building and warehouses to a depth of 15 feet. Two days elapsed before we were even able to enter our buildings. Every finished part, every piece of raw material in stock had to be cleaned and greased. Every milling machine, every lathe, every drill press, every grinder, every welder, every piece of equipment in the plant had to be completely dismantled, cleaned and rebuilt.

This herculean task has been accomplished and we are ready again to give prompt service on new ice scoring machines, ice vendors, and all maintenance parts. We greatly appreciate the patience of many users of our equipment who have been inconvenienced by delay in having orders filled.

We again solicit orders for new machines and repair parts for old ones. Inquiries and orders will have immediate attention and will now be especially appreciated in that they will greatly assist us in recouping the enormous loss we have sustained.

Perfection

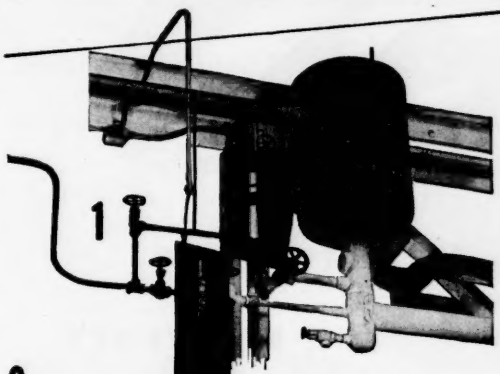
ICE SCORING MACHINE COMPANY

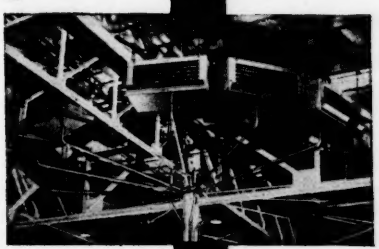
Phone 3-1258
P.O. Box 2140
FORT WORTH, TEXAS

the world's largest refrigerated warehouse

equipped with ALCO VALVES!

The Alford Warehouse, Dallas; 7,500,000 cubic feet of cold storage, and 8,000,000 cubic feet of air conditioned storage.





A wide range of cold storage temperatures will be efficiently handled by:

- **M8 SOLENOID VALVES** controlled by
- **J5 FLOAT SWITCHES** on liquid lines;
- **EPR 600 Series EVAPORATOR PRESSURE REGULATORS** controlled by
- **D922 TEMPERATURE PILOTS** on suction lines.

However large or small, simple or complex your requirements may be . . . you'll find the right answer in ALCO's *complete line* of refrigerant controls. Your ALCO wholesaler will be glad to advise you.

1 ALCO J5 Float Switch and M8 Solenoid Valve controlling flow of liquid ammonia into surge drum.

2 Typical cluster of ceiling blower coils with ALCO Controls on both liquid and suction lines.

Desi[gn]ed Manufacturers of T[herm]atic Expansion Valv[es], [Evap]orator Pressure Regu[lators], Solenoid Valves; Float[s] Float Switches.

3779

ALCO VALVE CO.

835 KINGSLAND AVE. • ST. LOUIS 5, MO.

OZITE
INSULATING FELT

For over 50 years, all-hair OZITE insulating felt has set the pace for efficiency in cutting power costs . . . stopping heat losses, and providing low-temperature control.

You can get all the facts by requesting Bulletin No. 300 — send for a copy today.

100% HAIR FELT
LASTS A LIFETIME
EASILY INSTALLED
APPLIES WITHOUT WASTE

Write for Bulletin No. 300 Today!

AMERICAN HAIR & FELT COMPANY
Dept. L97 Merchandise Mart, Chicago 54, Illinois

The *DEMAND* Is for QUALITY ICE

For Ice That Will Not Produce Slime In Ice Boxes...

Use DISTILEX This Way...

Dispense with Soda Ash, Sodium Aluminate, Alum and Similar Products . . . and

SIMPLY MIX DISTILEX WITH THE LIME YOU ARE NOW USING!

Block on left treated with Distilex, only one core emptied. Right, untreated water, cores were emptied twice. Most Distilex users do not empty cores at all.

***RESULT** . . . .* High-grade Crystal Ice from raw water . . . Ice free from slime and deposits . . . Ice without color, odor, taste . . . Ice which can be produced at very low temperature* with no cracking while being frozen, dumped or cut.

*DISTILEX treated water can make Ice in LESS THAN 35 HOURS at 10° brine temperature!

Test DISTILEX in your plant. If not entirely satisfied, purchase price will be refunded on all DISTILEX returned. $25.00 per 100 lbs., f.o.b. Birmingham.

Use SOLVEX for COMPRESSOR COOLING SYSTEMS

HIGH HEAD PRESSURES QUICKLY LOWERED with this remarkable chemical. SOLVEX can be quickly applied without breaking a joint. REMOVES RUST, SCALE, ALGAE, OIL AND ENCRUSTING MATTER from condenser tubes and water jackets in one to five days operation. Ideal for cleaning scale and corrosion from boilers, heaters and tanks.

An effective conditioner for spray ponds and cooling towers. SOLVEX goes to work immediately WITHOUT COSTLY SHUTDOWNS. Cooling efficiency is rapidly restored by using one pound per 10 gallons of water.

Write NOW for Further Particulars on These MONEY-SAVING AIDS TO BETTER ICE MAKING!

The CSCO STABLEIZER MAINTAINS GOOD BRINE by a positive reaction to either OVER-ACIDITY or OVER-ALKALINITY!

A scientific combination of pure metals upon which damaging materials in brine will "feed" in preference to the brine tank or ice cans, thereby SAVING them!

the CSCO STABLEIZER removes destructive material from the brine without adding harmful chemicals. Easily installed in all systems. No other brine treatment compares in SAFETY! The STABLEIZER does not make brine harmful to workmen's hands. PROTECTS AND PRESERVES EXPENSIVE EQUIPMENT!

CHEMICAL SOLVENT COMPANY

3005—16th Street North — Birmingham, Ala.

MOISTURE-RESISTANCE of PALCO WOOL pays off in BANANA PROFITS

One of six banana storage rooms operated by Chaknis Fruit Co., State Farmers Market, Atlanta, Georgia. High humidity and rapid temperature changes create special condensation problems.

Warm Southern climate makes high efficiency of Palco Wool doubly important in maintaining profits at this Atlanta plant.

6 refrigerated rooms for bananas and 2 for fruit storage account for approximately 5,500 sq. ft. of refrigerated area at Chaknis Fruit Co.

C. L. Fain Co., also at Atlanta Farmers Market, protects 6000 sq. ft. of refrigerated area with Palco Wool Insulation. This includes 4 banana rooms, 3 for produce.

Refrigerated rooms of this Fain Co. plant, as well as those of Chaknis Co., were designed and built by Southern Insulation & Supply Co., of Atlanta.

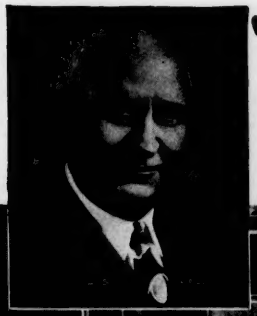
Condensation is always a problem, but it's a *vital* question in banana storage. Rooms are held around 56 F, raised to about 70 F for ripening, then brought back to the 56 F range. These rapid changes plus high humidity mean excess condensation. Even with most modern vapor-seal methods, insulation MUST be moisture-resistant. That's why Palco Wool Insulation is ideal for banana storage—and all low-temperature operations. Like the age-old Redwood bark from which it is made, Palco Wool is noted for non-hydroscopic characteristics. Fibers will not absorb any perceptible amount of moisture from the air. Even when submerged, they will not support capillary action. This means that year after year Palco Wool will retain its extremely high efficiency with a thermal conductivity of only .255 Btu. In addition, it is the only flame-proof Redwood bark insulation. Non-settling, odorless and odor-proof, resistant to rodents and insects, and low in cost—PALCO WOOL is the ideal low temperature insulation. Investigate before you insulate!

Write today for the PALCO WOOL COLD STORAGE MANUAL
or the LOCKER PLANT PLAN *and* CONSTRUCTION MANUAL

FLAMEPROOF INSULATION FROM DURABLE REDWOOD BARK

THE PACIFIC LUMBER COMPANY

100 Bush Street, San Francisco 4, California
5225 Wilshire Blvd., Los Angeles 36, Calif. 35 E. Wacker Drive, Chicago 1, Ill.



"On sanitation we take no chances- we insist on Packaged Processed Ice"

SAYS LOUIS G. PALMER, OWNER, YE OLDE WAYNE CLUB, DETROIT, MICH.

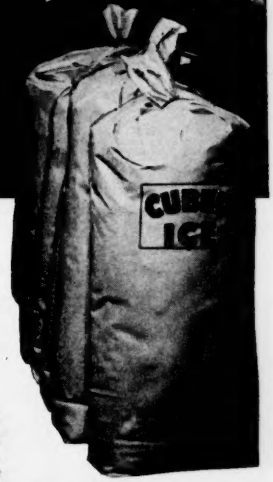
A view of the Mad Anthony Room of Ye Olde Wayne Club, a smart dining place of Detroit, Mich.

Watch Processed Ice Sales Go Up When You Switch to Paper Bags!

SALES always go UP when you switch to Union one-trip paper ice bags for processed ice! That's because icing with these handy bags is so easy that customers use more ice. And the cleanliness of ice delivered in old-fashioned open-top containers is insured by the tightly closed top of the Union bag, which keeps out dirt and prevents spilling or pilferage.

Yes, the Union one-trip ice bags cut your costs, too. The sturdy wet-strength paper — two layers thick — definitely retards melting. Eliminating re-handling of old-style containers speeds up operations at the loading dock, saves drivers' time.

You win on sales and you win on lower costs when you switch to Union one-trip paper ice bags. Write for samples.



Wet-Strength Paper Ice Bags have tremendous strength even when soaking wet... thanks to a water repellent resin that binds the fibres of the paper firmly together.

ONE TRIP

UNION Paper Ice Bags

A product of the UNION BAG & PAPER CORPORATION • Woolworth Bldg., New York 7, N. Y.

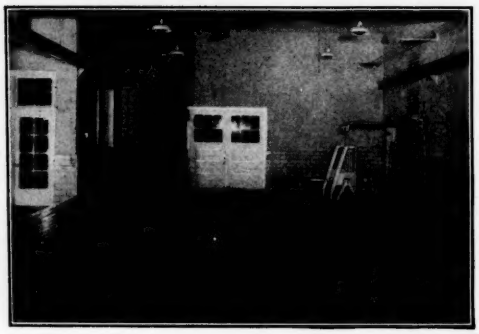
Bags of Kraft, Transparent Films Waxed Paper Glassine, Laminates

Another

50-Ton Ice Plant

Kentucky Ice Service is proud of this model installation at Bowling Green, Kentucky. The entire plant is about as modern and sanitary as can be constructed, with white tile wainscoting around the interior, plastered walls and ceilings finished in white enamel, etc. Frick equipment was selected for the job by Radabaugh-Corbitt Company, Engineers, after very satisfactory experience with a similar plant at Nashville, Tenn.

Specify Frick Refrigerating and Ice-making Machinery for that special plant in which you are interested. The nearest Frick Branch Office will gladly give you recommendations and estimates.



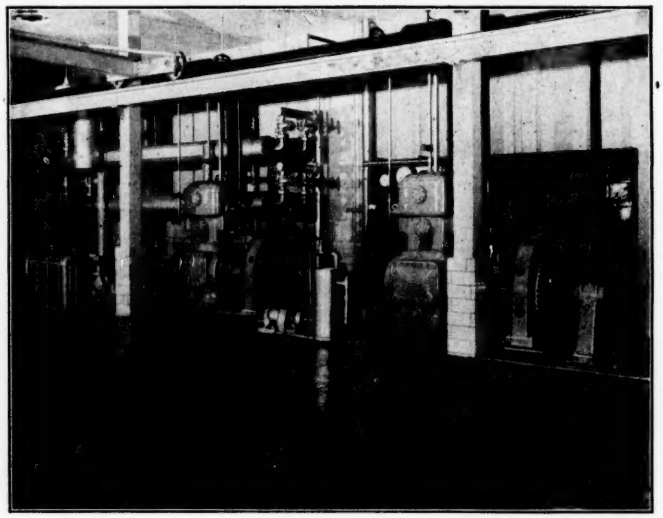
The Office Overlooks the Tank and Machine Room as Well as the Platform: Bowling Green, Ky.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Two Frick Compressors with Capacity Controls at Bowling Green.



FRICK BRANCH OFFICES

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Boston 20, Mass.
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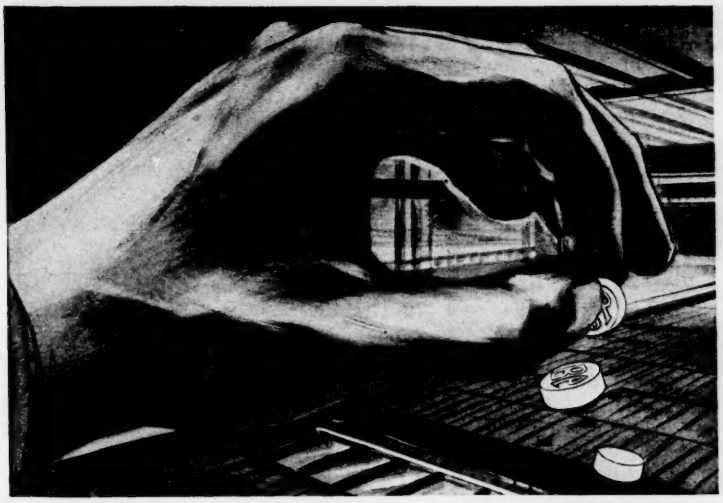
Cincinnati 2, Ohio
Dallas 1, Texas
Kansas City 6, Mo.
Los Angeles 14, Calif.
Memphis 3, Tenn.
New Orleans 12, La.
New York City 17
Oklahoma City 3, Okla.
Palatka, Florida
Philadelphia 7, Penna.
Pittsburgh 22, Penna.
Saint Louis 2, Mo.
Washington 5, D. C.



TEMPLETS
MAKE ICE BETTER AND FASTER

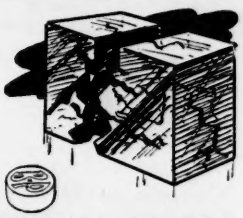
Here's a little thing . . . that makes a *big* difference in your ice production! 2 or 3 Templets tossed into each ice can do the trick. Your same plant, your same equipment can now produce BETTER looking, better handling merchandise. It can produce a greater quantity per working day. Yet, Templets are comprised of ordinary, harmless chemicals that do not affect taste or purity. Send the coupon in today. See for yourself how these little tablets work "like magic"!

TEMPLETS are being used in Ice Plants throughout the United States and in many Foreign Countries.

FREEZE FASTER!

Time is money . . . and especially so when you can manufacture more, handle more, sell more in LESS TIME! Try Templets. You can operate your brine tanks at *lower* temperature with beautiful results.

IMPROVE TEMPER!



TEMPLETS make ice that tends to cleave properly . . . stop shattering and "bad breaks." This is a big help in speeding your handling and cutting, especially with inexperienced men. It prevents waste, too.

HAVE CLEAR ICE!

eye-appeal counts! So . . . while you're at it, why not produce ice that's beautifully crystal clear! Try Templets and SEE!

PRESCRIPTION

℞ **TEMPLETS**

For sick ice, 3 in water as many times daily as needed

BARADA & PAGE, Inc.
Guinotte & Michigan Avenues
Kansas City 1, Mo.

Please send complete information on *Templets*. Also trial sample.

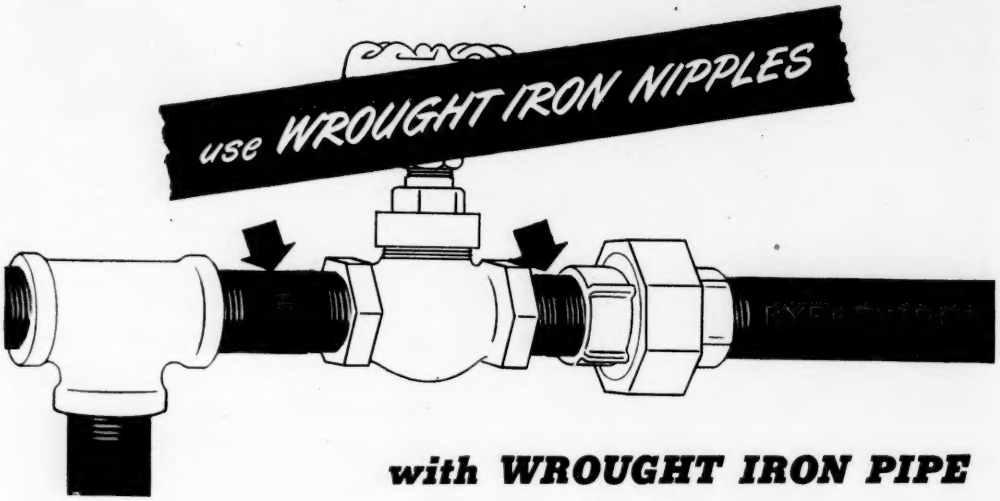
Name .....

Plant .....

Street .....

City and State.....

Avoid "Weak Links" in your piping systems—



with WROUGHT IRON PIPE

When you specify wrought iron pipe to lick some corrosion problem, assure 100% protection by specifying that the pipe nipples also must be wrought iron. Neglect of this simple precaution will leave weak spots in your lines, and set the stage for maintenance headaches.

METHOD OF SPECIFICATION

Merely stating that the piping "system" is to be black or galvanized wrought iron is not enough; the use of wrought iron nipples should be specifically designated. This may be done by requiring that the wrought iron nipples shall be made of pipe conforming to the requirements of A.S.T.M. Specification A72-45, Federal Specification WW-P-441a, Navy Specification 44P11k, or any accredited proprietary specification.

WIDE RANGE OF SIZES

Byers Wrought Iron nipples, both standard weight and extra strong, are available in a wide range of sizes and lengths, either black or galvanized. They are manufactured from new, tested, full-weight wrought iron pipe in accordance with the standards established in the specifications of leading technical organizations. All nipples are furnished with right-hand threads unless otherwise specified; nipples with right and left-hand threads are also available. Nipples are furnished "close" or to length as specified.

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IN THIS ISSUE —

Accidents Analyzed

A relatively minor failure in a refrigerating system may result in damage by contamination or spoilage amounting to thousands of dollars. Recognizing this, engineers of the Hartford Steam Boiler and Inspection Co. made an analysis, based on a survey of approximately 200 accidents in insured refrigerating systems. Causes of these accidents and a safety program based on this survey are presented in the article on page 19.

Effect of Storage Upon Asparagus

Results of a series of storage studies with asparagus with emphasis on changes in the ascorbic acid content, fibrousness and color, as affected by the temperature and duration of the storage period are published in the article on page 23. This report is the result of research work conducted by the Department of Horticulture, College of Agriculture of the University of Maryland.

The Ice Industry Today

An adequate and illuminating description of the ice industry today and some of the modern thinking about its present and future was presented by George Steers of Kalamazoo, Mich., at the annual convention of the Eastern States Ice Association. Mr. Steers called attention in vivid language to some of the opportunities which the ice industry is missing and some of its opportunities for better business for the future. This paper is published in part on page 27.

Fiber Versus Wooden Egg Storage Cases

A recent ruling of the Chicago Mercantile Exchange that all lots of eggs set aside for future delivery must be stored in wooden cases has emphasized the claims of some storers that fiber cases are unsatisfactory. To obtain a close-up inspection of both wooden and fiber cases and to ascertain the preferences among warehouse personnel a study of the subject was made by the Poultry Branch of the U. S. Department of Agriculture. A discussion and findings of this study are published on page 38.

Meeting Competition of "Automatic" Ice Makers

A new service kit has been prepared by the National Association of Ice Industries which provides information and selling talks to enable ice distributors to meet the competition of the new "automatic" ice makers. Claims of the machine makers are answered by facts and a definite program of approach is provided. The new service kit and program is described in the article on page 25.

Frozen Food Storage Equipment

In recent years many different types of refrigerating equipment have been developed and applied to freezer storage rooms. A query to the NAPRE Question Box asked if there is any general agreement as to the best method of refrigerating such rooms. Replies from a user and an equipment manufacturer analyze the different considerations involved on page 47. There is some difference of opinion indicated.

Maintaining Quality in Frozen Egg Products

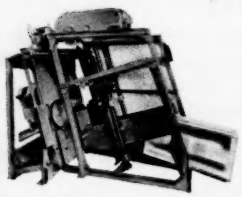
Methods of processing, storing and defrosting frozen eggs is the subject of a study financed by The Refrigeration Research Foundation and conducted by Ohio State University. This report published recently has information of value to processors, storers and users. It is summarized on page 56.

Coating Shell Eggs with Plastics

The preservation of shell eggs by coating them with plastics has been investigated by the Agricultural Experiment Station at Cornell University and the results published. It was found that mineral oil or oil emulsion coatings are effective methods of retarding losses of carbon dioxide and water vapor during subsequent storage. Extracts from this report giving additional findings are published with the article on page 41.

Cold Storage Holdings

Report on the volume of commodities in cold storage on May 1, as made by the U. S. Dept. of Agriculture show that occupancy of cooler space was up slightly while that of freezer space was down. The report is summarized on page 43.



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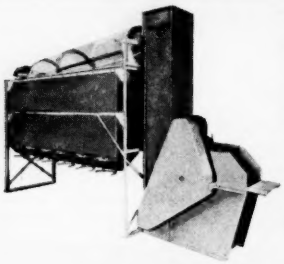
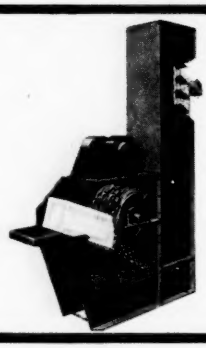


SERIES S-16 ICE SIZING UNIT—Combines Breaker-Elevator Unit S-16E and the new G-W 620 Precision Breaker with screen and bagging bin assembly. Four types meet varied requirements in elevator heights and bin capacities, assuring full production capacity and bagging output. Write for Bulletin No. 482.



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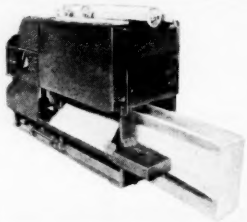

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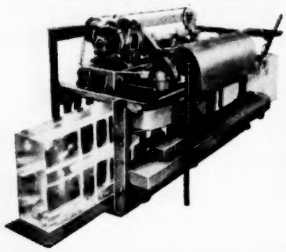

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Refrigerating System Accidents Analyzed

By T. R. Hardin and A. J. Phillips

Chief Engineer and assistant chief engineer, Boiler Division, Hartford Steam Boiler Inspection and Insurance Company

THE use of refrigeration for the processing and preservation of food products and other perishables has increased so rapidly during the past two decades that at the present time it is a vital factor in the economic life of the nation. One of the problems created by this trend is the loss which occurs when products or materials in process or in cold storage are spoiled by a lack of refrigeration or are contaminated by contact with refrigerants, particularly ammonia.

In many instances a comparatively small system may supply all the necessary refrigeration for the cold storage of large quantities of perishable goods, and a relatively minor failure in the system, such as leakage from a cracked or ruptured refrigerant coil or brine pipe in a cold room or cold box, may result in damage by contamination or spoilage amounting to tens of thousands of dollars. Because of this, and because refrigerated food is an important factor in our lives today, the Hartford Steam Boiler Inspection and Insurance Company recently made an analysis of accidents to refrigerating systems, not only for the purpose of determining the major causes of such accidents, but also with the expectation that certain preventive measures might, accordingly, be developed.

The analysis was based on a survey of approximately 200 accidents to insured refrigerating systems, covering a period of about two and one-half years. The survey concerned only pressure vessels and piping, without regard to machinery objects. For this reason, compressors, circulating pumps, driving motors, engines, and other such pieces of equipment do not enter into this discussion. The causes of accidents are as shown below:

Cause of Accident	Percentage of Total
Corrosion	34.7
Carelessness	21.7
Freezing	9.0
Defective Welding and Brazing	7.9
Defective Materials	7.9
Vibration	5.8
Overpressure	5.8
Poor Maintenance	2.6
Inadequate or wasted supports	2.0
Not otherwise classified	2.6

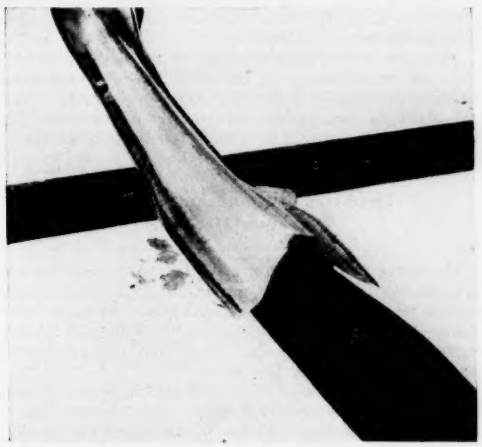
Corrosion

It will be noted that corrosion caused the greatest percentage of accidents, and of the total number in this category approximately 64% occurred to brine piping and condenser tubes.

Parts of refrigerating systems most susceptible to corrosion are condensers, piping containing brine or submerged in brine, and vessels containing either brine or refrigerant, located in cold storage rooms. Since most of these parts can be readily examined, it is reasonable to believe that accidents to them can be averted by frequent and regular inspections and preventive maintenance.

The corrosive effects of various brine solutions on different materials are well known, and much technical information is available on the subject. It is sufficient to state that serious corrosion will occur unless the pH value of the brine is properly controlled or suitable corrosion inhibitors are used; experience also indicates that cast iron is particularly susceptible to graphitic corrosion in brine solutions.

In many cases the water for use in condensers is cooled in open systems, where it becomes broken up into small streams or drops. Under such conditions the water will readily absorb oxygen, carbon dioxide or other gases that may lead to corrosion. Such contamination is apt to be most prevalent in localities where various waste gases are discharged to the atmosphere because of the nature of the manufacturing; for instance, areas surrounding chemical plants or steel mills. This condition may also be encountered in localities where soft coal with a high sulphur content is burned for fuel. In at least one specific case, condenser tubes failed to last two years, and only by installing a closed cooling system was the difficulty finally overcome.



The majority of accidents to refrigerating systems are of a kind causing little property damage of a spectacular, photographic nature, and yet the overall loss may be very large. Such is the situation with respect to the small piece of ruptured ammonia piping shown above. Contrary to orders, a workman had used boiling water to wash the piping while it was under pressure with the system charged. The piping tore open, released a large amount of ammonia and shut down the plant.

The portions of refrigerant piping that pass through floors, walls and similar locations are particularly susceptible to corrosion if installed in such a way that moisture can collect in the piping. Such piping should be installed in such a way that it may be periodically cleaned and protected.

Carelessness

Carelessness, which applies to those cases caused solely by inattention or carelessness on the part of employes, accounted for approximately 22 per cent of the accidents

Reprinted by permission from "The Locomotive," published by Hartford Steam Boiler Inspection and Insurance Company.

surveyed. One third of the accidents so caused resulted from piping being struck by hand (or motor) trucks, a little over one fifth occurred when cans or cases were dropped on piping, and a similar number resulted from improper defrosting methods in which sharp or heavy tools were used.

It may appear at first thought that very little can be done to eliminate acts of carelessness; however, much can be accomplished by proper supervision, education, and by the use of strategically placed caution signs.

Certain parts of the system, such as piping or vessels located near the floor or near loading platforms, are particularly vulnerable to careless acts and should either be relocated away from danger zones or provided with suitable protective guards. A recent survey of one large plant disclosed 59 unprotected locations where there was a possibility of small diameter piping being struck and broken off by employes handling carts, trucks, boxes, kegs or similar items.

The use of sharp or heavy tools for defrosting should be discouraged by proper education of employes assigned to such work. If tools are used, they should be limited to wooden, hard rubber, or other non-metallic mallets.

Freezing

Although most of the accidents caused by freezing occurred in water coolers of various types, several occurred to brine coolers and condensers.

Defective temperature controls, or the absence of controls on water coolers, is the most frequent underlying cause of freezing. Temperature controls on water coolers are essential equipment, particularly where there are periods of time when little or no water is being used from the coolers.

Defective Welding and Brazing; Defective Materials

The above two categories, which jointly account for approximately 15 per cent of the total number of accidents, include several cases where longitudinal seams or head seams of vessels failed. Accidents of this kind may involve bodily injuries or death and usually result in substantial damage to surrounding property.

Major pressure vessels in a refrigerating system should be of ASME Code construction, or its equivalent, and if welded piping is used it should be fabricated and erected either by a responsible concern or, if by plant employes, under close supervision. In any event individual welding operators should be properly qualified in accordance with the currently recommended procedure of either the American Society of Mechanical Engineers, the American Welding Society or the American Standard Code for Pressure Piping.

Several states and municipalities now have rules and regulations covering the design, fabrication and erection of refrigeration pressure vessels and systems, and it appears probable that many more will adopt such rules in the near future.

Vibration

Accidents caused by vibration consisted principally of the breaking of piping due to excessive vibration of compressors or of fans or motors forming parts of diffuser units located in cold storage rooms. In most cases the vibration of the fan or motor was the result of either loose holding down bolts, inadequate foundations, improper alignment, or worn bearings. Since such conditions normally require considerable time to develop, they can be corrected by a program of regular inspection and maintenance.

As an example of the costly damage that can result from a broken pipe, one accident involved a $36,000 loss to food products when a ½-in. pipe nipple connected to a float control on a diffuser unit located in a cold storage room broke after having been subjected to vibration. The bearings on the motor driving the diffuser fan had become badly worn, and because the piping supports were attached to the foundation on which the fan was set, the vibration caused by the worn motor bearings eventually caused the pipe nipple to break. Needless to say, the cost of replacing the nipple was inconsequential as compared to the value of the food products that were contaminated.

Overpressure

The greater percentage of accidents caused by overpressure occurred in parts of systems which were not directly protected by relief valves and while such parts were isolated from the remainder of the system during defrosting or cleaning operations. Diffuser units and flooded type coolers are especially apt to be so connected and operated that they can be subjected to overpressure.

In one specific case, almost $70,000 worth of food products became contaminated when a surge tank forming part of a diffuser unit ruptured while the diffuser coils were being defrosted by spraying them with relatively warm water.

Several other cases involved flooded type coolers, which are being used increasingly for cooling and processing milk or other fluids. Such coolers normally operate at about 40 psi ammonia pressure and are customarily provided with relief valves set at pressures ranging from 75 to 150 psi. In each case, either a large quantity of warm milk or other fluid was dumped into the cooler, or hot water or steam was being used for cleaning, thus causing a rapid rise in the pressure of the refrigerant. Because of closed valves in the inlet and suction lines, the pressure could not be relieved, and in a few instances where there were relief valves they were useless because of their location on the system side of the stop valves.

Any part of a refrigerating system which can be isolated from the system as a whole should be protected against overpressure by directly connected relief valves, and these should be kept in good operating condition.

Poor Maintenance

This category includes accidents not grouped under any of the preceding categories and includes failures of a minor nature caused by improper maintenance of equipment.

Inadequate or Wasted Supports

Although only 2 per cent of the accidents were caused by inadequate or wasted supports, several such failures resulted in the liberation of enough refrigerant to cause the spoilage of large quantities of materials in cold storage.

In addition to considering the causes of these various accidents, it is interesting to note the parts that failed initially. The analysis in Table I. concerns this aspect of the subject, and it will be observed, as might be logically expected, that those parts that are most susceptible to corrosion, or to damage from careless acts, accounted for the largest percentages.

It was stated earlier that this survey was undertaken with the expectation that certain corrective measures might be indicated that would be effective in reducing accidents to refrigerating systems. The results point definitely to a

TABLE I. TABULATION OF PARTS WHICH FAILED INITIALLY

	Percentage of Total
Refrigerant Coils in Cold Rooms	24.2
Refrigerant Coils in Brine Tanks	14.2
Condenser Tubes	13.2
Refrigerant Coils in Water Coolers	8.5
High Pressure Gas Lines	7.9
High Pressure Liquid Lines	5.3
Low Pressure or Suction Lines	5.3
Refrigerant Vessel—Shell	2.1
Refrigerant Vessel—Head	1.6
Processing Vessel—Shell	2.6
Processing Vessel—Head	2.2
Gaskets	2.2
Gauge Glasses	1.2
Miscellaneous	9.5

number of things that should be helpful in this respect and these are set forth as follows:

Suggested Corrective Measures

1. Parts of refrigerating systems that are particularly susceptible to corrosion should be periodically examined and preventive measures taken promptly if corrosion is present. These parts include: condensers, vessels containing brine, piping containing brine, piping submerged in brine, and refrigerant piping in cold storage rooms.

2. Any parts of systems which may be damaged through carelessness should be protected by means of suitable guards.

3. All vessels and piping in the system should be of adequate design and, if of fusion welded construction, should meet the requirements of a recognized code.

4. Methods of defrosting should be carefully studied, and any improper or hazardous methods should be discontinued.

5. Any part of a refrigerating system which can be segregated from the system as a whole by means of valves should be protected against overpressure.

6. All protective devices and automatic controls should be checked regularly and kept in good operating condition.

A More Specific Program

As an example of a more specific program which can be set up, the following is one agreed upon by a large meat packing plant after a careful survey revealed many hazardous conditions to which its refrigeration system was exposed:

1. Start a program of education in safe methods and practices for operating, maintenance and production employes.
2. Institute regular periodic inspections of the entire system by trained employes.
3. Install "Caution" signs at strategic locations as reminders against carelessness.
4. Installation of suitable guards at all vulnerable locations.
5. Adopt a color code for piping.
6. Relocate and provide permanent identification for stop valves so that they are accessible and easily identified.
7. Install remotely controlled magnetic stop valves on ammonia lines wherever practicable.
8. Install back pressure control valves.
9. Revise the pump-out system to reduce ammonia losses whenever leaks or breaks occur.
10. Provide a portable exhaust system to speed up removal of ammonia fumes from cold rooms and other similar locations.
11. Provide improved ammonia protective equipment for employes.
12. Eliminate all unnecessary piping.

Adaptable to All Plants

It is realized that a program similar to that above may be too extensive and not entirely applicable to many types of refrigerating plants, but many points included therein are applicable to all plants and, if followed, will materially lessen the possibility of costly failures to refrigerating systems.

Industry Shows Better Safety Record for 1948

INDUSTRY had a banner safety year in 1948, the National Safety Council reports. Last year's industrial injury rates, released by the Council, show a substantial reduction in both frequency and severity of accidents to employees as compared with 1947.

The accident frequency rate for all industries submitting reports, based on the number of disabling injuries per 1,000,000 man-hours, was 11.49 in 1948, a reduction of 13 per cent from the year before.

The communications industry again led all other industries by turning in the lowest frequency rate. Its rate was 2.60, a 13 per cent reduction from 1947. The aircraft manufacturing industry was second best with a frequency rate of 4.56. This was a reduction of 36 per cent and brought the aircraft manufacturing industry up from fifth place standing in 1947.

Lumbering was at the bottom of the frequency list in 1948, with a rate of 49.04, but this represented a reduction of 18 per cent from the year before. Coal mining, which ranked next to the bottom of the frequency list in 1947, ended 1948 in the same position with a rate of 46.09, a 15 per cent reduction.

The accident severity rate for all industries reporting, based on the number of days lost per 1,000 man-hours, was 1.12 last year, a reduction of 9 per cent from 1947.

Communications again had the lowest severity rate, leading all other industries with a rate of .18, a 13 per cent increase over 1947. The tobacco industry ranked second with a rate of .19, a reduction of 21 per cent from the previous year, when it was in fourth place. Coal mining once more stayed at the bottom of the list, with the highest accident severity rate of 7.61. But this was a 4 per cent reduction from 1947. Mining, other than coal, ranked second from the bottom both years, but its 1948 rate of 6.37 was worse by 3 per cent than the year before.

The complete 1948 injury frequency and severity rates by industries are shown in the tabulation below:

EDITOR'S NOTE: Some units in the industrial refrigeration field are well represented in the data presented while others are not. The dairy and brewery oprations are included in the food industry. The experience of some refrigerated warehouses is included in storage and warehousing but only six cold storage companies reported. These six did well however, their frequency improved 25 per cent over last year and was only 36 per cent of the industry frequency reported to the Safety Committee of N.A.R.W. No significant ice industry data is included in the Safety Council report.

1948 INJURY RATES BY INDUSTRY

FREQUENCY	Disabling Injuries Per 1,000,000 Man-Hours	Per Cent Change From 1947	SEVERITY	Days Lost Per 1,000 Man-Hours	Per Cent Change From 1947
Communications	2.60	−13	Communications	.18	+13
Aircraft Manufacturing	4.56	−36	Tobacco	.19	−21
Electrical Equipment	5.56	− 8	Wholesale and Retail Trade	.22	+29
Steel	5.86	− 4	Printing and Publishing	.43	−33
Cement	6.81	− 6	Aircraft Manufacturing	.44	+ 7
Chemical	7.51	−15	Electrical Equipment	.45	0
Railroad Equipment	7.58	− 6	Leather	.48	+50
Tobacco	7.72	+18	Glass	.48	−27
Rubber	8.35	− 8	Storage and Warehousing	.55	−44
Automobile	8.47	−16	Misc. Manufacturing	.56	+12
Textile	8.79	0	Textile	.58	+ 7
Misc. Manufacturing	8.83	− 6	Meat Packing	.63	−16
Service	9.00	−20	Rubber	.65	− 7
Glass	9.50	−13	Automobile	.65	− 2
Sheet Metal	9.75	−24	Service	.82	+290
Printing and Publishing	9.83	−11	Machinery	.84	+ 2
Shipbuilding	10.14	−34	Sheet Metal	.90	−13
Wholesale and Retail Trade	10.35	+ 8	Chemical	.90	− 2
ALL INDUSTRIES	11.49	−13	Transit	.97	−29
Non-Ferrous Metals and prod.	12.14	−13	Iron and Steel Products	1.02	+26
Petroleum	12.27	− 7	Food	1.09	− 6
Storage and Warehousing	12.41	−29	Shipbuilding	1.11	−49
Machinery	12.84	−11	Gas Utilities	1.11	−11
Iron and Steel Products	13.96	+ 7	ALL INDUSTRIES	1.12	− 9
Electric Utilities	14.80	− 4	Pulp and Paper	1.14	−18
Air Transport	15.05	− 8	Petroleum	1.16	−13
Pulp and Paper	15.15	−17	Railroad Equipment	1.26	+14
Leather	15.47	− 8	Non-Ferrous Metals and Prod.	1.30	−13
Construction	16.51	−32	Woodworking	1.52	−23
Meat Packing	17.84	−20	Clay Products	1.58	−15
Transit	18.01	−31	Steel	1.65	+ 3
Food	18.10	−11	Foundry	1.74	+29
Quarry	19.07	+12	Air Transport	1.88	−11
Clay Products	19.53	−19	Electric Utilities	2.11	−12
Gas Utilities	19.93	−10	Marine Transport	2.29	−19
Foundry	21.06	−16	Construction	2.51	− 5
Woodworking	25.22	−16	Cement	2.72	− 4
Marine Transport	26.43	−12	Quarry	3.38	− 8
Mining, Other than Coal	40.47	−20	Lumber	4.64	−11
Mining, Coal	46.09	−15	Mining, Other than Coal	6.37	+ 3
Lumber	49.04	−18	Mining, Coal	7.61	− 4

Effect of Storage Upon Ascorbic Acid Content, Fibrousness and Color of Asparagus

By L. E. Scott, A. Kramer, and R. B. Guyer
University of Maryland, College Park, Md.

THE conditions under which a vegetable is held from the time of harvest until it is sold to the consumer may greatly affect its appearance, attractiveness, palatibility and nutritive qualities. The results of a series of storage studies with asparagus, with particular emphasis on changes in the ascorbic acid content, fibrousness and color, as affected by the temperature and duration of storage period are reported in this paper.

Methods

The asparagus used in the experiments was harvested as "green" asparagus, with a minimum length of 6 inches above the ground level. The spears were trimmed to 8-inch length and stored with the butt ends immersed in water in constant temperature chambers. A total of five different harvest lots was used; in the first three lots, the asparagus was harvested from the University research plots and placed in the storage chambers within three hours after harvest. The last two lots, which were obtained from a commercial grower, were not placed in storage until 24 hours after harvest. The storage temperatures employed ranged from 32 to 86 F. Samples for observation and analysis were taken at the beginning of the storage period and at two-day intervals thereafter, until the end of the test.

Results and Discussion

Ascorbic Acid Content. The ascorbic acid content was determined by the indophenol dye-xylene extraction method of Robinson and Stotz (6). In all of the tests it was found that an increase in the storage temperature or an increase in the length of the storage period was reflected quite sharply in a lower ascorbic acid content of the asparagus. The ascorbic acid values of Lot 3, typical of the results obtained, are given in Table I. It is evident that a great loss of the vitamin occurs even at the low refrigeration temperature of 32 F. At higher temperatures, this loss is accentuated so that at 70 F. more than a third of the ascorbic acid disappears in the first day of storage. These findings are in agreement with those of Platenius (5) and Kays (2), who likewise have shown the rapid loss of ascorbic acid in asparagus during the storage period.

TABLE I—Effect of Temperature and Duration of Storage Period Upon the Ascorbic Acid Content of Fresh Asparagus

Storage temperature	Ascorbic acid content (mg./100 gm. fresh weight) after storage of: 0 days	1 day	3 days	7 days	Mean of temperature
32 F.	65.2	66.0	49.3	31.3	53.0
40 F.	65.2	60.2	47.0	26.2	49.6
50 F.	65.2	49.2	36.2	20.8	42.8
70 F.	65.2	38.1	20.7	10.0	33.5
Mean of Storage	65.2	58.3	38.3	22.1	
L.S.D. (5% Level)	Between individual readings:			8.6	
	Between temperature or storage means:			4.3	

When separate segments of asparagus spears were analyzed, the highest concentration of ascorbic acid was always found in the tips, with a definite gradient toward the base of the spear. Comparative contents of the different segments are shown in Table II. It will be noted that the 4½ inch tip contains about twice as much ascorbic acid as the lower segments. A terminal cut of about this length is normally used for the higher quality packs in the processing of asparagus. After storage there was no perceptible trend toward equalization of the ascorbic acid content in different parts of the spear, so that the gradient was found to persist after all storage treatments.

TABLE II—Distribution of Ascorbic Acid in the Asparagus Spear

Lot 3 Segment of spear	Ascorbic acid (mg/100gm)	Lot 4 Segment of spear	Ascorbic acid (mg/100gm)	Lot 5 Segment of spear	Ascorbic acid (mg/100gm)
1¼" tip	69.9	4½" tip	27.6	4¼" tip	34.5
1¼" to 2½"	45.8	4½" to 6"	15.0	4¼" to 5¾"	19.1
2½" to 3¾"	35.6	6" to 7"	13.4	5¾" to 7¼"	16.6
3¾" to 5"	31.2	0" to 7"	21.1	7¼" to 9"	15.1
0" to 5"	42.8	Snapped tip	26.7	0" to 7¼"	25.7
Snapped tip	43.1			Snapped tip	31.8
L.S.D. (5% level)	5.3		1.7		1.1

Color Changes During Storage

Color is an important quality factor of "green" asparagus. Kramer, Haut, Scott and Ide (3) have developed rapid quantitative methods for measuring color in asparagus. These methods were used to determine the effect of storage conditions upon the color of the asparagus in the experimental lots. In all lots there was a significant loss of color

TABLE III—Effect of Temperature and Length of Storage Upon Color of Fresh Asparagus (Color Expressed as mg. Chlorophyll Per kg. Fresh Weight)

Lot 3 Storage (days)	Color	Lot 4 Storage (days)	Color	Lot 5 Storage (days)	Color
0	149.2	0	124.2	0	87.6
1	144.0	2	128.7	1.5	77.4
3	134.4	4	62.7	3.5	74.6
7	103.9	6	43.9	5.5	60.3
L.S.D. (5% level)	14.9		7.5		6.4

Lot 3 Temperature	Color	Lot 4 Temperature	Color	Lot 5 Temperature	Color
32°	142.8	32°	92.1	32°	77.1
40°	140.2	50°	87.1	50°	72.8
50°	127.4	68°	90.5		
L.S.D. (5% level)	14.9		not sig.		not sig.

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during storage, amounting in Lot 3 to more than half of the original content, and in the other two lots to about one-third (Table III). The effect of storage temperatures was not important. It would seem that increasing duration of the storage period resulted in a loss of green pigment, to a large extent independently of storage temperature.

It should be pointed out that the asparagus in these tests was stored in unlighted chambers. Such storage would probably be comparable in light conditions to that existing in refrigerator cars in transit. It is highly probable that exposure to normal daylight during storage would have given different results..

This loss in color during storage was evident in casual visual comparison of stored and fresh lots of asparagus. The stored lots were obviously paler, exhibiting a much less intense green color.

Fiber Content of Asparagus

Since fibrousness of asparagus is probably the most important factor in determining edible quality of the fresh or processed product, any change in the fiber content due to storage conditions is of interest. Tables IV and V, giving the data on fiber content of the experimental lots, show that there is little effect of either length or temperature of storage upon the amount of fiber in the spears. In fact, there seems to be a tendency toward less fiber with prolonged storage.

The organoleptic (taste) ratings of fibrousness of the different samples, as determined by a panel of judges, are also given in Table IV. These ratings show no significant

TABLE IV—Fiber Content of Fresh Asparagus, Before and After Storage (Fiber Content in mg. Per 100 gm.)

Stored (days)	Lot 4 Fresh Weight Basis	Lot 4 Dry Weight Basis	Lot 4 Organoleptic Ratings*	Lot 5 Fresh Weight Basis	Lot 5 Organoleptic Ratings
0	298	....	7.00	484	6.89
2	293	4260	7.57	325	6.84
4	286	4420	6.97	361	6.85
6	270	4110	6.08	315	6.87
L.S.D. (5% level)	n.s.	n.s.	.71	124	n.s.
Stored at:					
32°	236	4800	6.76	341	6.97
50°	187	3940	6.85	401	6.96
68°	166	4060	7.09	....	....
L.S.D. (5% level)	n.s.	n.s.	n.s.	n.s.	n.s.
Segment of spear					
4½" tip	44	480	9.11		
4½"–6" cut	184	2910	6.49		
6" to 7" cut	883	12690	3.51		
snapped tip	66	960	8.51		
L.S.D. (5% level)	106	1890	.71		

* Organoleptic ratings decrease with increasing fibrousness of spears on the basis of 10 to 1.

Correlation coefficient between fiber content on fresh weight basis and organoleptic rating: Lot 4 r = –0.88; Lot 5 r = –0.91.

effect of storage temperature on fibrousness in either lot, and no effect of duration of storage period in Lot 5, and only a slight effect toward the end of the storage period in Lot 4. The correlation coefficients of –0.88 for Lot 4, and —0.91 for Lot 5, between the fiber content and the organoleptic ratings, indicate that the method of the fiber determination employed very closely reflects the degree of fibrousness determined organoleptically.

These results, obtained relative to the fiber content of asparagus during storage, are at variance with the earlier studies of Morse (4) and Bisson, Jones and Robbins (1), who found a distinct increase in fiber associated with increasing duration and temperature of storage. The method of fiber determination used probably accounts for the difference in results. The method of Smith and Kramer (7) which was used in the present tests is entirely physical in nature, involving the mechanical separation of the fibrous tissue by washing after maceration with a Waring Blendor. The crude fiber method used by the earlier workers separates fiber through dissolution of non-fibrous material by the action of hot alkali and acid.

Crude fiber by the official method was determined on a series consisting of 28 samples from Lot 4. These values are listed along with the values obtained by the rapid method and the organoleptic ratings in Table V. The rapid

TABLE V—Fiber Content of Asparagus as Determined by the Official and Rapid Methods

Sample	Segment of spear	Per cent fiber on fresh weight basis: Official method	Rapid method	Organoleptic rating*
1	4½" tips	.058	.02	9.5
2	"	.071	.02	8.5
3	"	.060	.01	9.5
4	"	.054	.02	7.8
5	"	.054	.03	9.2
6	"	.075	.04	9.7
7	"	.063	.05	9.2
8	"	.073	.04	9.2
9	"	.058	.07	9.2
10	Snapped tips	.061	.04	9.5
11	"	.065	.23	6.8
12	"	.067	.04	8.8
13	"	.080	.13	7.7
14	"	.079	.05	8.0
15	"	.068	.05	6.8
16	"	.071	.07	7.8
17	4½" to 6" cut	.066	.19	6.5
18	"	.067	.25	5.5
19	"	.058	.25	8.0
20	"	.080	.24	5.8
21	"	.054	.10	7.7
22	"	.058	.25	5.3
23	"	.061	.11	7.8
24	"	.064	.14	6.5
25	"	.066	.14	6.0
26	6" to 7" cut	.088	.94	2.2
27	"	.086	.91	4.0
28	"	.083	.48	4.3

Correlation coefficients from above data:
1. Between official and rapid method + .59
2. Between official method and organoleptic rating — .47
3. Between rapid method and organoleptic rating — .85

* Organoleptic ratings decrease with increasing fibrousness of the asparagus on the basis of 10 to 1.

method gives a much wider range of values, showing lower fiber values for the non-fibrous samples, and higher values than the official method for the more fibrous samples. The correlation coefficients obtained from these data show that the rapid test for fiber is in much better agreement with the organoleptic ratings.

Summary

In storage studies with asparagus, it was found that the ascorbic acid content of the spears decreased rapidly with both increasing temperature and duration of storage. Approximately one half of the original ascorbic acid content was lost after storage for one week at 32 F. At 70 F., the loss may equal 90 per cent.

The green color of the spears decreased during the storage period, but the temperature of storage had little effect on the color.

There was no significant change in the fiber content of the spears during the storage period.

(Continued on page 60)

The Ice Industry

National Association of Ice Industries

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Service Kit Shows How to Meet Competition of New Ice Making Machines

TO HELP meet the new competition of "automatic" ice making machines, the National Association of Ice Industries has issued a service kit with materials and a practical plan for use of ice distributors. This service kit labeled "Ammunition to Meet the New Competition" is based upon research that has been made in the fields of technical research, advertising and marketing practices and techniques, market analysis and the legal aspects of all of these elements of the problem. The various departments of the National Association of Ice Industries cooperated in the preparation of this material.

First, the Research Department developed the technical and economic facts about these ice makers and the claims being made by their promoters. Then, it utilized that data in the compilation of the "Ice Cost Analysis Sheets" and an accompanying explanation, "Analyzing Costs of Making Ice in 'Automatic' Ice Makers," which constitutes an important part of this kit.

Second, the Public Relations Department set itself to the problem of developing and producing an effective program of advertising copy and materials for use by the industry on a national level and for local use by ice companies in their respective market areas. The results are a series of advertisements to be carried in national publications in the commercial field and the booklet, "Let's Look at the Facts," included in this kit for local use in contacting ice customers.

Coincidental with all of this work, the Personnel Training and Marketing Department made a careful study of the marketing problems involved in meeting this new competition and the several plans and methods which have been developed and used by individual ice companies in various parts of the country. The result is a carefully developed over-all marketing plan titled "Meeting Automatic Ice Maker Competition" and a suggested market survey card included in the kit.

Contact the Customers

It points out that experience with some ice companies has shown conclusively that most ice accounts can be retained if they are properly contacted by a representative BEFORE an order has been placed for one or more "automatic" ice makers. This contact should be made by a well-versed representative, preferably the manager, sales manager, or branch manager of the company. This representative should make an appointment with the manager or proprietor of each of the commercial stops that use enough ice to be a prospect for an "automatic" ice maker.

His approach should be that the company is making a survey of all the larger accounts to be certain their ice requirements are being furnished on the most economical basis. He then can complete the survey form, and discuss the customer's refrigeration equipment and the uses for

Ice Cost Analysis Sheet

Capacity Required		
Pounds of Ice used during the past year	93 600	
Pounds of Ice used per day during peak days of the season	690	
Number of automatic Ice makers required	2	
Capital Investment		
Delivered price of Ice-making machines 2 machines @ $ 1966 per machine	$ 2932	
Cost of electrical wiring	25	
Cost of plumbing for drain with trap	30	
Cost of plumbing for water connection	35	
Carpentry work and other installation costs	45	
Total Capital Investment	3067	
Overhead Cost Per Year		
Depreciation (12½% per year on $ 3067)	$ 383.38	
Interest (6 % on ½ Total Capital Investment)	92.01	
Maintenance and repairs	180.00	
Property taxes	60.00	
Fire and liability insurance	21.99	
Rental value of floor space required (90 sq. ft. @ $ 2.50 per sq. ft.)	80.00	
Other overhead costs		
Total Overhead Costs Per Year	$807.38	
Overhead Cost Per 100 Pounds of Ice Required ($807.38 cost per year ÷ 936 cwt. ice required)		$ .86
Operating Cost Per 100 Pounds of Ice Made		
Power (6 KWH per cwt. x 3 ¢ per KWH)	$ .18	
Water (60 cu. ft. " " x 12 ¢ per 100 cu. ft.)	$ .072	
Sewer (60 cu. ft. " " x 2 ¢ tax 100 cu. ft.)	$ .012	
Total Power and Water Costs per Cwt.	$ .264	
Adjustment for rejects 20 %		
Adjustment for shrinkage %		
Power and Water Cost Per 100 Pounds of Ice Plus Adjustments for Rejects and Shrinkage	$ .33	
Labor—Supervision, Cleaning Equipment Handling Ice, etc.		
Hours of labor per year (12 hrs. per day x 319 days per yr.)	960	
Total cost of labor per year ($1.00 per hr. x 960 hrs.)	$ 960	
Labor Cost Per 100 Pounds of Ice Required ($960 ÷ 936 cwt. required)	$ .50	
Total Operating Cost Per 100 Pounds of Ice Required		$ .83
TOTAL COST OF ICE MAKER ICE PER 100 POUNDS		$ 1.69
Cost of Ice Per Year Using Automatic Ice Maker (936 cwt. @ $1.69 per cwt.)	1581.84	
Cost of Extra Ice Purchased Due to Failure of Machines (24 cwt. @ $1.00 per cwt.)	24.00	
TOTAL COST OF ICE PER YEAR USING AUTOMATIC ICE MAKERS		$1605.84
TOTAL COST OF ICE PER YEAR, FROM YOUR ICE COMPANY		$ 936.00
SAVING PER YEAR WHEN YOU BUY ICE FROM YOUR ICE COMPANY		$ 669.84

Ice cost analysis sheet used in connection with the service kit for meeting ice cube-making machine competition, the above analysis of one ice customer's requirements shows a saving in favor of genuine ice amounting to $669.84.

which he buys ice. If the customer is contemplating purchase of an "automatic" ice maker, or has been called upon by a representative of some company selling them, that fact doubtless will come to light during this conversation. In such a case, the representative should tell a straightforward, factual story about the superiority and advantages of ice, using a copy of "Let's Look at the Facts" to highlight his presentation. The folder should be left with the customer at close of the interview.

Experience has shown that a majority of commercial ice customers who have purchased one or more of these ice makers still must continue to buy a certain amount of ice for one reason or another. Therefore, it is a serious mistake for an ice company to pass up or disregard the former customer who has installed this equipment.

As a matter of fact, regaining and retention of much of that profitable tonnage can and should be sought vigorously. This work ought to be just as intense as well-planned, aggressive effort to convince a present customer of the advantages and economies of relying exclusively on the ice company for his requirements.

Many icemen have, during the past 25 years, assumed a mistaken attitude of "getting mad at" and deleting from their list of customers, millions upon millions of people who have purchased domestic mechanical refrigerators. Today . . . where proper service is provided . . . experience is proving that many thousands of these people are buying as much ice, used for auxiliary purposes, as they ever purchased when they were exclusively ice users . . . and at a better price.

It is well known that one of the selling arguments used by the "automatic" ice maker people . . . and probably one of the most effective . . . has been their disparaging statements as to irregular, inefficient and unclean ice delivery service. It is a foregone conclusion that two strikes have been called on any ice company guilty of this type of service, and that any factual arguments which might be offered as to advantages and economies of ice will be almost completely nullified until that situation is corrected.

Claims and Facts

A 16-page bulletin sets forth in vivid and dramatic style with illustrations, certain claims that are made for these machines, and facts are provided in answer to these claims; these facts being bolstered by information developed by research and careful study of the problem.

Claim No. 1, as to savings of 60, 70 and 90 per cent, etc., is answered by the fact that it really costs less to buy genuine ice than it does to make it.

Claim No. 2, that it increases profits is answered by the fact that a customer gains all around with genuine ice.

Claim No. 3, that the machines produce pure, clear, cubed ice is answered by the fact that a customer gets the purity and the sparkling clearness they hope for in genuine ice.

Claim No. 4, that a machine freezes all the ice the customer wants as it is needed is answered by the fact that for convenience and dependability, he can't beat genuine ice.

In addition to answering claims, additional facts are presented as follows: Genuine ice lasts longer in drinks and in storage; from every angle, lower cost, certainty and customers' satisfaction, everything considered, it pays to use genuine ice.

Ice Cost Analysis Issued

One of the important reasons why ice cube and sized ice customers are buying "automatic" ice makers is because of the failure to proper analyze costs. To show them where this question enters the picture, an ice cost analysis sheet has been prepared. Through its use, the ice company will be able to accurately and thoroughly measure each costomer's costs of making his ice requirements on the machine.

This ice cost analysis sheet has space for recording the capacity required, the capital investment, average cost per year, operating costs per 100 pounds of ice made, the total cost of ice-maker ice per 100 lbs. as compared to the total cost of ice per year from the ice company. When all these items have been properly entered and computed, in nearly every case, it will be shown that purchase of ice from the ice company is more economical than installing an ice-making machine.

Trade Paper Advertising

As an additional aid in this campaign, the Public Relations Department of the National Association has prepared an advertisement for trade papers covering the commercial ice field. This advertisement says: "There is a difference in ice. The ice your ice company makes is solid and hard frozen, slow melting, pure crystal clear, and it costs less! Compare this kind of ice with any other ice you ever saw."

This advertisement will appear monthly from May through September in the following publications: Club Management, Hotel Management, Food Service News, American Restaurant, Beverage Bulletin, Chain Store Age, Fountain Service, Liquor Store & Dispenser, Restaurant Management, Hotel Bulletin, Union Server. The combined circulation of these papers is 288,786, practically every one of which is a prospect for crushed ice.

In presenting this kit, the National Association suggests that each ice company adjust the suggested use of the material to the characteristics of its own market area. It is believed, however, that this material and the plan for its use will be effective in meeting this new competition if it is used with determination and thoroughness.

A warning is issued, however, that all of the material and the plan for using it, is based on the premise of personal contact sales work with commercial customers. Experience has shown that the problem cannot be met successfully by printed advertising alone, although a liberal use of advertising is helpful in supplementing and opening the way for personal sales work.

Selling Ice in Local Markets

INTRODUCING material for use in fostering the sale of ice and associated products in local markets, the Public Relations Department of the National Association of Ice Industries points out that "running a business without advertising is like whistling at a girl in the dark . . . You know what you are doing, but nobody else does!"

A portfolio with a cover page reading "Ice Selling—Ideas and Material for your Local Advertising" is on the press now. This attractive portfolio contains all the selling material necessary to make a firm impression and impact on the local market. It is divided into two sections, newspaper and radio.

The newspaper section comes in two parts. First there are four pages of artwork and hand lettering on coated stock. These can be used as copy for illustrations. The newspapers will be able to make plates from them. They are large or small as needs require. Following the artwork there are several pages of suggested layouts in various sizes for suggested copy for each ad layout. They can be used "as is" or revised or interchanged.

The radio section has "Spot Announcements" to be used for suggestions only. They can be used "as is" or changed. While there are not enough of these to cover all the different subjects every ice company might require, there is ample material here to do a good selling job. There is material on refrigerators, ice chests, auxiliary ice and vegetable icing and the announcements are in a variety of lengths.

What is The Ice Industry Doing?

By Geo. Steers Jr.

Kalamazoo Ice & Fuel Co., Kalamazoo, Mich.

Geo. Steers Jr.

These excerpts from a paper presented at the annual convention of the Eastern States Ice Association gives an adequate and illuminating description of the ice industry today, its failures, its shortcomings and its opportunities. It is gloomy but cheerful and it presents evidence that thinking today clearly points the way to a brighter future—if enough ice men will use the opportunities available. Mr. Steers, as operator of an ice manufacturing and distribution business for many years, past president, and at present member of the executive committee and chairman of the Public Relations Department of the National Association of Ice Industries, is well qualified to speak for the industry.

WHY don't we merchandise ice and equipment? It is too much trouble. Second, it is a losing proposition. Third, the local merchant sells some and we don't want to compete with him. That means mostly we are too lazy. The fourth reason is that equipment has been short and still is. It will always be short if we don't sell some. These manufacturers can't get any orders and that is why it is short. Fifth, no salesmen. Sixth, our drivers are too busy to train and they are making too much money. Seventh, everybody is mechanically-minded in our market. Why should we sell ice and equipment in which to use it?

First, to enlarge our market. If we don't sell it, who will? Ask yourself why should they sell equipment more than we who service it? Third, we want to keep and improve our load factor. So much for the analysis and criticism. You are probably wondering what we are doing about it in our town. All right, here are a few of the things.

Ice Merchandising in Kalamazoo

First, to enlarge our market to our old users, we sell a supplementary commercial chest for the storage of added ice and to give us less frequent service to the commercial trade, to every outlet in the city. We call a commercial outlet for ice anyone that takes over a hundred pounds at a delivery.. We haven't a single one in the town that doesn't have a supplementary chest and we sell it to them. We rent it to them or we give it to them. We get it in in some way in order to cut down the frequency of delivery required, and also to see that they always have ice for any use that they happen to have, and frequently we go around and exchange these chests and give bigger ones and take the old ones back at the full price in order to get bigger ones in.

A second installation is the multiple installation of water coolers. In our town the city water supply is 55 degrees in summer, so it is pretty hard to sell a water cooler on the basis that you have got to have a cold drink. However, we have gone out to our industrial plants and our sales approach was, "How much it costs your employes for a drink of water."

Most of the union contracts require that they have cold water for the employes to drink, and when you get into these plants where the labor costs two cents a minute and up, it doesn't take very much to sell water coolers on a wholesale basis when you show them how much it costs an employee to walk all the way down the plant to a water cooler with all the other opportunities for loitering that exist while he gets a drink of water. They might almost as well give him an ice cold bottle of Coca-cola for nothing. We sell these coolers on a wholesale basis and try to have them located every 50 to 60 feet.

What do we do with these new users and who are they? Well, we are working on the truck gardeners for the packing of vegetables at the farm, the place where they are raised, before they come into the city market in trucks. We are working on the vegetable stands and the man who sells melons. These fellows that sell melons along the road have no way of cooling a melon. So we dump a truckload of ice and they bury the melons in the mound and it makes a very pretty sight and the customer takes the ice and the melon, and in that way they can move melons by the carload and you will move ice by the truckload.

Now on bottled milk. In some of our industrial plants, they have these automatic machines for vending bottled milk, but they are not portable. We have convinced them that if they can peddle sandwiches, they might as well peddle milk and we found that if they move the milk with ice on it, the bottle looks cold and people buy drinks that look cold and they run up their sales two hundred to four hundred per cent.

Another item is the sale of ice cream freezers and mix. On this, you can get into a cooperative effort with your dairies. We could sell about 600 ice cream freezers a year if we could get them. This year I think we will be able to get all we want.

On picnic chests, we sell about 500 a year. We have twenty dealers handling them now,—sporting goods outlets and dealers, and also Montgomery Ward is putting in a window when the fishing season opens, displaying them in all their stores. We moved 500 of them last year.

Two years ago, on our national program, Stanley Foran, sales manager for Dr. Pepper, said the soft drink manufacturers considered the cooling of beverages as part of the manufacture of it. It isn't fit to drink unless it is cold, so they are very interested in cooling it. But the significant thing he said about Dr. Pepper sales is that 62 per cent are sold through grocery stores warm, so there is plenty of opportunity for us to do something with the cooling of soft drinks that go out of the grocery stores and vegetable stands by the dozens.

Domestic refrigerator sales are important too. We do anything we have to do to get them out. We sell them, we rent them, we give them away once in a while.

We do the same thing on reach-in commercials and vegetable cases and chests, and I want to underline the " and chests" because we don't sell the case alone. There is a chest that goes with it, unless the fellow can tell us why he doesn't need it. Unless you tell him, he won't know that he should have the chest, so we lump the two together unless there is some reason for dispensing with the chest.

It is important to do some pioneering. Each year we develop one project to make new users and enlarge the market. If it does nothing else, it will help you get started thinking about your own business, so it is worthwhile from that standpoint, and every once in a while you will hit a project that will pay.

Last summer in Kalamazoo we had two of these new projects. There is a summer resort about fifteen miles out of the city that has some very fine summer homes, and we went out and surveyed the market. They are all people that have mechanical refrigerators, but we convinced them they needed supplementary ice. We sold them commercial chests to put it in, delivered the ice in hundred pound bags, and by twice a week service we kept those chests filled on an experimental basis of $1.25 a hundred delivery.

We made the route twice a week, a 35-mile round trip. We sold 52 tons of ice and after paying equipment to pay all of the out-of-pocket costs for making the route and all of expenses covering labor, the truck and everything else we had $1100 profit on the deal.

Another one we tried last year was to contact the beer fellows who sell cased beer packed in cardboard boxes on the road to the ball park. We convinced them that beer sold in that manner, while it might be cold when it left the place, would be warm by the time the buyer reached the ball park. We sold them on the idea of packing three cans with ten pounds of ice. The customer paid 25 cents premium for the case of beer iced that way and the beer man was happy, the customer was happy and so were we.

On freezer promotion we have one we are starting soon. We are going to give away free ice cream, made in the homemade freezer, and sell bottled mix at the time we are doing it. We cooked that deal up with one of the dairies that makes ice cream mix. They bottle it in quart bottles and we tell the customer which dairy they can get the mix from and the dairy puts collars on their milk bottles telling them where they can get the freezers—from us.

We have done a little work with mechanical meat cases. We find that we have to check up on the fellow to see that he keeps the temperature below freezing or the ice won't work, and that takes a bit of doing, but still it can be done.

Now, I want to tell you a story of another one with a headache. Benton Harbor, 55 miles west of us, is the largest peach market in the country. They handle about a million bushels of peaches a year, and last year they had a peak of 110,000 bushels in one day.

The Extension Department of Michigan State College at two locations put on a pre-cooling project with the aid of the National Ice Association and the company which makes steri-cool equipment. They pre-cooled 23,000 bushels of these peaches as a demonstration. It took 18 pounds of ice per bushel. They reduced the temperature from 80 to 40 degrees at a cost of 15 cents per bushel for everything, including the rental of the equipment, the hypochlor, which was the chemical to put in the water to arrest the bacterial growth, the labor and the ice; and the peaches brought 50 cents per bushel premium after paying the 15 cents cost. The fruit packer wouldn't buy the equipment to do the job and the ice man wasn't interested in furnishing the ice!

Every example I have cited ignores, supplements or has no connection with mechanical refrigeration. Can you do it? Sure you can. Forget about mechanical refrigeration and go to work.

Here is what has been done with an appliance merchandising set-up in our area, a town of 10,000 people. Here is the equipment, sales and annual load these sales represent, and you can figure out what you can do from this example by multiplying or dividing the 10,000 population to fit your town.

111	domestic refrigerators per year	460 tons ice
4	reach-in commercials 24 cu. ft.	28 tons ice
15	vegetable cases, 2.6 ton per ft.	234 tons ice
10	beverage chests	150 tons ice
4	water coolers	16 tons ice
100	ice cream freezers	15 tons ice
500	picnic chests	100 tons ice
		1003 tons ice

The average mark-up on this equipment was 50 per cent. The driver was paid 5 per cent for prospects and the department pays its own way and makes money.

Why can't we all join the parade of American business success? If you have a good product and a good service, put it out when the public wants it, in a form in which they want it, with suitable equipment to use it in such as we know they need to get the most benefit from our product and service. Charge whatever is necessary for all this to make it possible and profitable to do it.

The American public has proved time and again that they will pay a high price for goods and services which they have been convinced they should have. They have also proved that they would not pay a low price for goods and services which they did not want. Just having it cheap is not enough. We are looking for opportunities such as we now have in this business in other businesses, and one of the big problems we have is to stir the ice industry to a realization of the opportunities they have within our own business and to do something about these opportunities.

An Appraisal of the Ice Industry

I want to make an illustration of that point by giving an outsider's analysis of the ice industry. First, it is an established business with a long profit record. Next, it has a maximum volume operating with a minimum attention on the part of management and furnishing a minimum of customer service. Third, it has a product so standardized that it has lost its glamor and modern appeal. The quality is improving, but it is not consistent nor is it universally good.

The service is poor to bad, and it is not improving at a rapid rate. The personnel is not well selected, not of a good calibre, not trained; it is not interested and it is badly in need of young blood. Its public relations on a national level were never better, and are improving, but on a local level they are not good. In most places they are bad and they are not improving. The management lacks vision. It is not open minded. It lacks daring. It is too hesitant. It lacks willingness to try and do new things. It is not interested in customer desires and lacks enthusiasm and confidence in the future of the business.

I think you will agree that this is a fair analysis of the ice business if it were made by an outsider.

Practically everyone I know in our industry, whether an owner or an upper strata executive who works as an employe, has made enough money so they have invested in other businesses or are looking for other businesses to invest in. Let's look at what they want and how they analyze other business opportunities if they do more than just place a bet.

First, they want a business which is going to be profitable or can be made so on the investment limit which they set for themselves. Second, they want one which makes or sells an article which the public wants or furnishes a service which the public wants. Third, they want one which will hold their interest, but not take their whole time and attention. Fourth, they want one that looks like it had a good future.

Appraisal of New Business

Well, let's assume they find one which answers these four requirements to their satisfaction and they decide to go into it. We take for granted that the new business will require a modern product of obviously high quality, attractively packaged from a clean and attractive plant. Second, that they have a trained, attractive appearing, willing and energetic personnel. Third, that they offer a convenient service in meeting the customer's needs and

wants. Fourth, that the business do some aggressive selling to get business, to keep business, and to build good-will for the enterprise. Fifth, that the business advertise the merchandise and service offered, because only by advertising can one bring their goods and services to the public attention, make the work of the sales and service organization effective, and build up good-will for future business.

Let's assume we go into this new venture because it is a good, profitable investment with a good future, and what do we find from the experience? We find that the new plant and equipment costs more than expected; that the trained, attractive and energetic personnel was expensive and hard to find; that the service required to satisfy the customer was exacting and was a lot of work to build up and supervise; that lots of selling was required and it was costly and hard to do; that it took a lot of time and attention.

We never imagined the amount of advertising one had to do and how costly it was, and there were more ways to do it, too. And you had to go along, because your competitor did if you didn't, and you wanted the business that advertising would get and you wanted to let the public know that you were in the business. After all, you were no piker even if you were new to the game!

Well, how does that new business look now by the yardstick which took you into it? Is it profitable? Yes, but not so much as we thought—too big an investment and too big an expense. Does the public want it? Sure they do, but you have to make them want it. There was no weatherman to do the work for you. It is a lot of work to make people want your stuff. It took more time than you expected—too much. "Why, 75 per cent of my total time and attention went into the new business."

Future Not So Rosy

The future looks a bit rocky, too; kind of up and down, you know. You can't expect it to run smoothly, but I've got to give it the old time and attention or the future will be bad and I will lose a big chunk of my investment. It is bigger than I wanted it to be anyhow, so I've got to look out. It keeps taking more all the time, too, to keep up with the market and the competition. It sure takes about all the old ice business can make to supply the capital for the new business.

Did I say ice business? Well, let's look at that again. Is that profitable? Well, it sure must be or I couldn't get into these other businesses. Does the public want the product and the service? Well, they must, for we have been selling about all we could make. Is it interesting to me? Well, it should be, but I guess it hasn't been too much so for I certainly haven't given it too much of my time and attention.

What about a good future? Sure looks as good as this new business for a while if we do our stuff. Only I never thought of the ice business, in this way before, and of the five requirements which went with the new business, which also go into the ice business.

What were they again? A modern product of obvious high quality, attractively packaged from a clean attractive plant. A trained, attractive-appearing, willing and energetic personnel. A convenient service meeting the customer wants. Aggressive selling to get business, to keep business, to build good-will. Of course you had to advertise to get attention from the public and make the work of the sales and service organization easier.

If I had done those things to my ice business, it would have fulfilled all my expectations of a desirable business and still would have taken less of my time and attention than the new business did and would have returned a better profit.

Now, the purpose of this business analysis and its application to the ice business is to show why we must do something different than what we have been doing.. We have all the tools required to do a real merchandising job. There is nothing above enumerated in the way of knowledge and equipment which is not available to us. We have an established business volume and it is profitable. We don't have to build a volume from scratch or build up a volume to a break-even point to start promotional work.

Back to the Ice Business

We have plenty of demand for our goods and service. We have an excellently organized industry association which can supply us any of the helps or do any of the things for us which industry organization could do. We have an excellent sales and service training program available, and an excellent public relations program underway which every ice company should be tying into their markets.

Public relations are not optional. Too many in our industry think that it is something they can elect to have or not have as they see fit. If you don't elect to have a good public relations and do something about it, you have bad public relations for not having done anything. If you don't believe that, just try it.

We are on borrowed time. Times are returning to normal and fast. We must improve our business position now while we can. In production—there may be some new plants in your market area by new people, if you don't get busy with a higher quality product, put up in the form the customer wants it. In selling—we are going to be competing for a share of the customer's dollar with other industries as more supplies and services are available, each trying to get a portion of these customer dollars. In service—it must be not what we want to furnish or what is convenient for our employes to furnish, but what the customer wants which will count. In advertising—we must keep the public convinced that our product is fashionable, that it is worthwhile and necessary to their health and enjoyment of living. We must localize our fine national program or it will fail to do the job for us and it will fail to carry on itself.

Too many ice companies do nothing about advertising or too little, especially if they have a stationery competition or no competition. In too many companies, if they do anything, they pay three cents per ton to National Ice Public Relations and set back and relax and expect national and local advertising plus local selling all for three cents per ton. Why don't all companies get in this work? Because you and I don't sell them and you've got to see them to sell them.

Periodically we receive requests in the national organization to get a fund raising organization to raise this money for us, so the good old volunteers will be relieved from having to put the bee on their neighboring ice men. We have spot checked that over the country at various times, and we know that if you can't sell your fellow ice men some stranger, who will get 15 per cent commission, hasn't a chance. It can't be done that way. It can only be done as one ice man to another.

In too many places our product and service is not available locally as advertised nationally, and we must each help correct that, for it's poor advertising practice, to develop customer interest and not have advertised goods or service available. We must correct this condition, otherwise the sales volume will not be produced to justify continuing the national promotion program. This failure to get sales volume will bring about a general loss of interest by the present supporters of the program, so more companies must not only support the advertising program with money, but must make the product and service advertised nationally available locally.

We cannot expect to either keep the business we have or the tools we have to do our job if we don't use these tools

and go to work, each in our own home town. We must get a lot of young men in our industry, and you should try this and just see how hard it is to do. You have got to make it interesting nowadays for smart young men to come into the ice industry because they don't believe it has a future. But it is worthwhile doing, for in selling these young people on our industry, you will sell yourselves on it too. Then let them have leeway to use their knowledge and enthusiasm to modernize your business. They don't know everything can't be done, the way you do, so they may surprise you.

There is too much of a feeling in high places among ice industry personnel that the ice business is washed up, that there is no future in it. That same feeling existed in 1925 when the household refrigerator was being mass produced by General Motors, General Electric and Kelvinator. And yet today the volume of the industry is twice what it was at that time. The fellows who were in a panic at that time got out of the ice business and the companies they were representing are twice as big as they were then.

We are devoting a lot of time on employee training programs telling how to train the man and put on a safety program for the man and a selling campaign for the man, but we have got to do something with the boss. They are not going to get anywhere with these programs if the boss doesn't believe in them. There is plenty to be done on the bottom but there is plenty to be done at the top too.

We are on a new level of high volume production and sales. There is an ever expanding need for ice and the service it will give. There is nothing wrong with the ice business now or that will be in the future that ice men can't correct. The tools to do the job are available and you have been shown how to use them. So help yourself to the future. I think it is good!

Gary Food Stores Find That Ice is Best for Vegetables

PRACTICAL evidence that processed ice is the best refrigerant for fresh vegetables in retail stores is furnished by the experience of food stores in Gary, Ind. A large number of these stores under the stimulus of Ben Landing, sales manager for the Barnes Ice & Coal Co., have installed processed ice counters for their fresh vegetables and all of them, without exception, are highly pleased with the results.

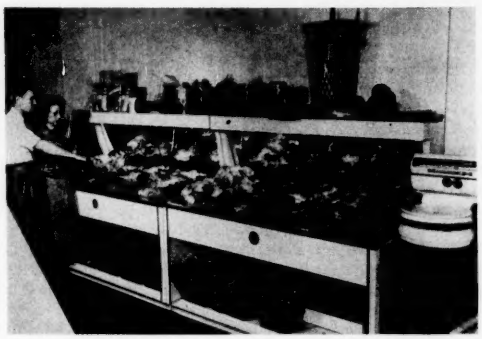
Renner & Sikora Market at 1080 Broadway has an unusual installation, a mechanical case converted for the use of ice. This mechanical case did not perform as represented as it dried out and wilted the produce. According to Ted Sikora, the converted case has reduced losses to almost nothing, and sales and profits have materially increased.

Paul M. Kobza is one of the progressive grocers in Gary who operates two stores in each of which he has a very fine produce business which has been built by the use of processed ice. The store shown in the picture below is in the center of the downtown residential section of Gary at 608 Adams St. Mr. Kobza says that ice refrigeration is far superior to other types. He says it makes a beautiful display with economy, and provides more profit. He is using processed ice at both of his stores with satisfactory results.

Paul Kolarek operates one of the modern food stores in Gary. Mr. Kolarek is president of the Gary Retail Grocers' Association and he made a full study of operating and merchandising before he installed processed ice equipment. He says he knows it has greatly helped their sales and their customers enjoy shopping where fresh produce is offered. His processed ice vegetable counter has reduced losses to practically nothing and has materially increased their sales, which means inreased profits.

Downtown food store operated by Paul M. Kobza.

The Renner & Sikora Market at 1080 Broadway, Gary.



Modern food store in Gary, operated by Paul Kolarek.

Fresh Fish in Beds of Crushed Ice Boosts Sales of Fish and Meats

This Oregon market which does a quarter million dollar meat and fish business each year is lavish in use of crushed ice in display cases.

SEVENTY-TWO CENTS worth of crushed ice started a chain reaction which skyrocketed fresh fish sales from $10 to $100, ten-fold, for a La Mesa, California, butcher. That's not all. The investment of 72 cents a week for crushed ice resulted in the following:

1. In four months' time customers coming to buy fresh fish, with all its flavor retained by means of display-on-ice, also shot meat sales up from an average $500 weekly to more than $1000.

2. The "chain reaction" of more fish and meat traffic increased sales in the grocery department $150 each day!

The scene of this action is Jimmy Legg's Market, 8691 La Mesa Boulevard, La Mesa, Calif. Chief actor is C. O. Birchum, operator of the meat department.

When Mr. Birchum came on the scene four months ago, fish sales at the meat counter were stagnant. Just $10 worth at retail a week. Then he spent his first 72 cents for 100 pounds of crushed ice. He packed the ice into a neat bed at one end of the regular meat case. On top of this bed of ice, he displayed his fresh fish.

Displayed on White Trays

Now he displays varieties of fresh fish in season on white enamel trays. These are placed in a setting of crushed ice. When lobster is in season the display is dressed up with rows of red lobster. Other times jars of fresh oysters are used to decorate the assortment of fresh fish.

Butcher Birchum's 27 years experience in the food business taught him the lesson that ice not only keeps the fish fresh; it also retains the moisture and the flavor of this delicate food. Ice is also instrumental in eliminating the tell-tale fish odor from the meat cases. Of course, Mr. Birchum keeps his cases spotlessly clean, too.

Once the housewives found out they could get flavor-fresh fish at this market, they came from all sections of the community. It was natural that the shoppers who came to buy fresh fish would also form the habit of shopping for meats and groceries in the same market. So sales mounted.

To keep the display fresh looking throughout, Mr. Birchum covers the ice pack with a couple of sheets of white grocer's wrapping paper each Thursday. He tucks the paper neatly under the edges of the ice, then displays his brimming trays on top. This way he has an eye-fetching display for weekend shoppers.

Mechanized Car Icing at Kansas City

THREE car-icing machines, designed and built by Railways Ice Co. have been delivered to their plants at Kansas City, Kans. and are being erected there. The machines provide mechanization of the car-icing operation and speed up the placing of the required ice in the bunkers of refrigerator cars.

When the new machines have been placed in operation, The Railways Ice Co. expects to release complete details of the equipment, its operation and performance.

American Ice Upheld in Suit

THE New Jersey Supreme Court has ruled in favor of American Ice Co. in a suit brought by holders of the non-cumulative preferred stock claiming dividend arrears. The Chancery Court last September had upheld the contention of the company that under its charter, holders of the preferred could receive dividends only out of net earnings of each year, and not out of general surplus.

Marketing Prepackaged Sweet Corn

SOME of the advantages and problems of marketing sweet corn prepackaged in consumer size packages at the point of production have been reported by the U. S. Department of Agriculture and the Florida Agricultural Experiment Station.

The findings are based on studies by the Marketing Research Branch of the Production and Marketing Administration, and the Bureau of Plant Industry, Soils and Agricultural Engineering of the Agricultural Research Administration, in cooperation with the Florida station. The work is being carried on under the Research and Marketing Act of 1946. Detailed reports on the preliminary findings are now available, although the research is continuing.

These conclusions were reached in the studies made by the Production and Marketing Administration.

Retailers in consuming centers found it relatively more profitable to handle the prepackaged sweet corn than bulk corn in husks; eleven stores realized an average final gross margin of 19.1 per cent of the sales value on prepackaged corn, compared with 13.6 per cent on bulk corn. Direct retail labor costs were about three cents per sales dollar lower and spoilage losses were about 10 cents per sales dollar lower for the prepackaged than for the bulk. In stores observed in four major cities (New York, Baltimore, Washington and Atlanta), retail sales per man hour averaged about $102 for prepackaged, against $16 for bulk.

Prepackaged corn retailed at a higher price than bulk corn. In this study, in which the corn was marketed as an out-of-season delicacy, the packaged product sold for an average of $1.16 a dozen. Bulk corn cost housewives $1 a dozen.

Selling and transportation charges were found to be 13½ cents for each dozen ears of prepackaged corn and 15 cents a dozen for bulk corn. Both the prepackaged and the bulk corn should be refrigerated throughout the marketing process, but directions for refrigerating the prepackaged corn were not always followed. In fact, the majority of those who said they did not like the prepackaged corn had purchased corn that had begun to deteriorate. Many consumers said they were pleased with the flavor, ease of preparation, visibility, lack of waste, cleanliness and convenience of the prepackaged corn.

The grower realized a gross return of 47 cents a dozen for the prepackaged corn, besides an additional value from husks and trimmings used for feed. He received an estimated 48 cents for corn in husks. Harvesting and packing costs were higher for prepackaged corn than for bulk corn. In this study the comparative costs were 21 and 12 cents a dozen.

Work at the same time by the Bureau of Plant Industry, Soils and Agricultural Engineering, with the same corn, on type of package and handling during transportation, showed that: Some ventilation through the wrappers is necessary in the packaged corn. Refrigeration to at least 45 F. is essential during packaging and transportation, and quality was better at about 32 F. Truck shipments of the prepackaged corn to markets east of the Mississippi proved the importance of precooling before shipment, as the temperature of a truckload of corn was lowered very little during shipment with any equipment tested. Best results in truck shipments came from mechanical units which cooled the air to much lower temperatures than those obtained with ice bunkers.

The work reported was done in April, May and June of 1948. Three hundred acres of Ioana, Golden Cross Bantam and Golden Security corn were grown on the Paul B. Dickman Farms at Ruskin, Fla. It was prepackaged in a plant operated on the farm. In the plant the corn was husked mechanically, trimmed to three-or five-inch lengths and cooled. Either three large or five small pieces were put in each cardboard tray and wrapped with cellophane. Then the corn was cooled again and 800,000 packages were shipped by truck to 200 cities east of the Mississippi river.

Although the research is continuing, detailed reports on the preliminary findings are now available at the Information Branch, Production and Marketing Administration.

Fishermen Buy Crushed Ice

CATERING to the ice needs of coastal fishermen and picknickers in general, the Central Power & Light Co., open for business 16 hours daily during the peak fishing season, between May 1 and October 31, has made very satisfactory ice sales, which are mounting steadily as more and more outing parties seek recreation on the Gulf coast, some 25 to 50 miles from Victoria, Texas.

D. M. Gibbons, platform manager for Central Power & Light, says: "These fishermen really go for our crushed ice. Formerly they bought it in bags, the 17 and 37-lb. sizes, but since the Sportsman's Ice Box or kit became popular, not so many years ago, the demand has practically doubled. These outers have the kits iced on the take-off, and they usually take along a bag or two for others lacking access to ice."

Ice Station Central Power & Light Co., Victoria, Tex.

Mr. Gibbons reports that they further upped their ice sales by supplying anglers and picknickers with the 'Sportsman's Ice Boxes', having procured many they could sell at a lower cost than the usual retail price.

Asked recently how they managed to ice up so many early-starting customers, Mr. Gibbons smiled and said, "We soon learned to open up in the pre-dawn hours. The word got around that we were catering to the needs of fishermen. We were and are serving their best interests and incidentally, our own."

Mr. Gibbons observes further, "I believe these Gulf-bound fishermen, more than any other group, keep an ice man, platform man that is, on his toes: when those boys—and gals—drive up for ice, you can see redfish swimming in their eyes. They may have the patience of Job waiting for fish to strike, but at the ice plant platform, they want to get waited on so they can get going."

Serving a wide population area, both urban and rural, the ice company naturally supplies the ice needs of stores, and private homes. Many of these farm folk purchase block ice, and the company sells or sub-lets thousands of pounds daily to so-called 'hot boxes', small buildings with insulated walls and roofs.

Ice Plant Installs Modern Power Equipment

AN EQUIPMENT modernization program back in 1941 and visions of more efficient and more economical service to the consumers of ice at New Castle, Ind., have payed dividends to the Consumers Ice & Fuel Co. of New Castle.

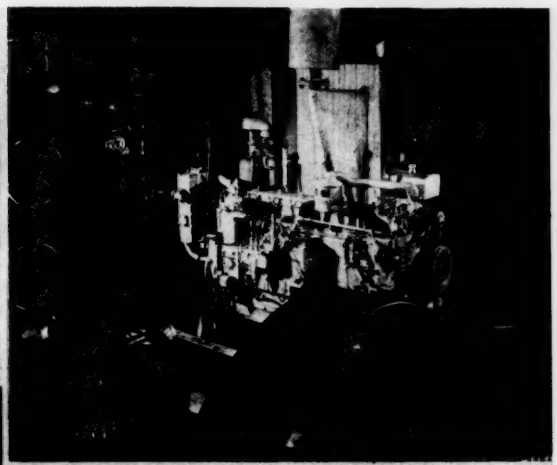
By progressing and expanding through the years, the ice plant has grown to its present-day status of a modern, fully equipped plant capable of producing almost 50 tons of clean, clear ice a day. The firm uses 15 ice trucks to supply ice for commercial, industrial and home comsumption within a 15-mile radius of New Castle.

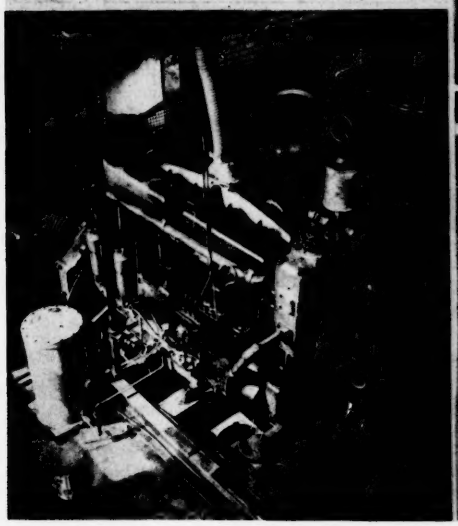
Furnishing the power and lights for the entire plant are three "Caterpillar" Diesel engines, one 115 hp. and two 62 hp. units. The 115 hp. engine was installed in 1941 when the company decided to replace the steam engine used to drive an ammonia compressor. One 62 hp. engine-generator replaced utility power for electric loads, including pumping water.

During the modernization period, equipment which permitted the company to use fresh water instead of distilled water for ice was put into operation.

In 1945, demand eclipsed supply and company officials saw the need for additional power equipment. The third engine, of 62 hp., was installed as a power source for another ammonia compressor, thus increasing the total volume of refrigeration for ice production.

The Consumer Ice & Fuel Co., is one of the progressive ice companies of Indiana, utilizing its fifteen delivery trucks to supply New Castle with modern domestic and commercial ice service.





Upper left: Platform and corner view of Consumers Ice & Fuel Co. plant, New Castle, Ind.

Upper right: One of the 62 hp. engines which drives an 8 x 8 two-cylinder compressor.

Lower left: The 115 hp. Diesel engine installed in 1941 and belted to the 9½ x 9½ ammonia compressor.

Lower right: General view of engines, compressors and equipment in plant of Consumers Ice & Fuel Co.

Wm. D. Wright Retires as Manager of Clinton Ice Company

AFTER almost 39 years of continuous service in the ice business in Clinton, Ill., Wm. D. Wright has announced his retirement as manager of the Clinton Ice Co. Mr. Wright joined this company in 1911 and was a stockholder and executive officer in the organization. When the property was sold in 1944 to the Peoria Service Co., Peoria, Ill., he remained as manager.

His duties will be taken over by Robert Grimm of Bloomington. Mr. Grimm is a young man, married, and the father of one child. He served more than three years in the Air Corps in World War II and since his release from service has been associated with the Manufacturers' Ice Co., Bloomington, which experience renders him well qualified for his new duties.

Wm. D. Wright, Clinton, Ill.

Mr. Wright retains his interest in the ice industry. He is vice-president of the Peoria Service Co., secretary-treasurer of the Illinois Association of Ice Industries, a position he has held for the past 23 years, and secretary-treasurer of the Unit Ice Association Secretaries Council.

Commenting on his retirement as manager, Mr. Wright wants all of his acquaintances and friends to know that he has not severed all his connections with the ice industry and has not lost any of his interest in the affairs of the industry which has been such a great part of his life for so many years, and that he expects to continue to serve the industry in any manner possible.

Canadian Association Appoints Assistant Secretary

TO ASSIST in the increasing association secretarial work, the Canadian Association of Ice Industries has appointed Mrs. Mildred Croft as assistant secretary. Mrs. Croft is well known to members of the Canadian Association members having occupied much the same position during the war years. Under the new arrangements, she will handle most of the detail work, leaving Mr. McCrea, executive secretary, free to cooperate more closely with association committees and members. She will have her office at her residence in Toronto.

Virginia Ice Manufacturers Association

THE annual meeting of the Virginia Ice Manufacturers Association was held Thursday, May 5, at Richmond, Va. Officers and directors were elected for the coming year and other business was transacted. The convention, while not having any elaborate entertainment, was a very worthwhile meeting and a sizable number of members were present.

One of the interesting features of the program was an address by S. Frank Straus, secretary of the Virginia Independent Food Dealers Association. Mr. Straus brought out some interesting and valuable facts about the increase in use of crushed ice by grocers for fresh vegetable display counters.

The Food Dealers Association is having its big convention the week of October 9-15 at the John Marshall Hotel in Richmond, Va. This will be a really first class food show and the association is arranging for a booth at the meeting. The committee is going all-out to make a real showing of iceman's ice and appliances for the benefit of food dealers and others.

Officers and Directors

President, V. L. Keyser, Covington, Va.
Vice-president, J. C. Epley, Charlottesville, Va.
Vice-president, J. F. Elliott, Charlottesville, Va.
Secretary-treasurer, H. H. Snyder, Alexandria, Va.
Directors: W. E. Hyde, Washington, D. C.; O. A. Reardon, Alexandria, Va.

Walton New Indiana Secretary

THE Indiana Association of Ice Industries announces the election of Robert W. Walton, 26 E. 14th Street, Indianapolis, Ind., to the position of Executive Secretary.

Robert W. Walton

Mr. Walton has been associated with the association as Field Secretary since August, 1948 and came to the Ice Association from the Fidelity and Deposit Co. of Maryland where he was engaged as a field representative for that company.

He is a graduate of the Indiana University School of Business and spent five-and-a-half years in the U. S. Army in the Adjutant Generals Department and was separated from the service with the rank of captain. He is a member of Phi Gamma Delta, the B.P.O.E. and the Indiana State Trade Executives Association.

Ice Company Ordered to Stop Rebates

DAMAGES of $12,198 asked by the Jefferson Ice & Fuel Co., Louisville, Ky., which it contended it had lost through secret rebates, were refused in Circuit Court, according to a news report. Judge Lawrence Speckman however ordered the Grocers Ice & Storage to stop making secret rebates to purchasers of large quantities of ice.

Invoking the State's Fair Trade Practices Act, the plaintiff contended it had lost $12,798 through the defendant's selling almost 15,000,000 pounds of ice by means of rebates. Although former Jefferson customers purchased large quantities of ice from Grocers, the plaintiff showed no proof of loss, the opinion held.

Bulletin Reviews National Labor Legislation Developments

A BULLETIN on important developments in labor legislation issued by The National Association of Ice Industries states that an early showdown on amendments to the existing Wage-Hour Law is expected. A new Lesinski Bill H.R. 4552 would change the law in only one particular, increasing the minimum from 40 to 75 cents an hour. Other bills provide for similar increases up to 75 cents.

The Lucas Bill, H.R. 4272, provides a flexible minimum starting at 65 cents an hour and tied to the cost of living and a redefinition of the "regular" rate excluding gifts, discretionary bonuses, profit-sharing bonuses, contributions made to trust funds for employe benefits, and premiums paid in excess of regular hours which give rise to "overtime-on-overtime" litigation.

Although five bills have been introduced it is believed that the major fight will be between the Lesinski Bill and the Lucas Bill. It is strongly recommended that members of the ice industry support the Lucas Bill.

Taft-Hartley Repeal

The proponents of Taft-Hartley repeal are now backing the Tomas Bill S. 249. This bill accepts the following compromises: Non-Communist affidavits from employers and labor leaders will be required; Unions as well as employers shall be required to bargain collectively; Free speech for all parties; Financial reports from unions; Presidential power to act in emergency strikes affecting the national interest (substitute for the injunction powers in the present Taft-Hartley Act). Much controversy and debate it is stated, will develop regarding the plant seizure provisions and separation of powers between NLRB and the General Counsel.

All ice company executives interested in the outcome of this legislation are urged to state their position to their Senators and Congressmen.

Ice Television Programs

A REPRODUCTION in black and white of "Naturally Yours", the ice industry film, has been produced by the Public Relations Department of the National Association of Ice Industries especially for use on television programs. It was first televised in Washington, D. C., some months ago over WMAL-TV and has since been to Memphis and Boston for the same purpose.

Ice distributors who have a television station in their communities are advised that the program director may be seeking interesting programs and in most areas there is no charge attached to having such a program televised. The TV print of the film is now available to ice distributors for transportation costs only.

Kiplinger Publicizes Ice Association

A RECENT issue of Kiplingers magazine has a two-page article telling how a trade association works in Washington. The National Association of Ice Industries and its executive secretary, Mount Taylor, are used as examples of efficient association functioning. Ice, it says, is a 350-million-dollar-a-year business and some 2,700 ice manufacturers in the United States pay money for the privilege of belonging to the association. Of Mr. Taylor, it says he is a Texan, formerly in the ice manufacturing business himself, and with a clear understanding of why he is there and what his job calls for.

Columnist Writes About Ice

ICE and a Pittsburgh ice company received favorable comment from Kenneth Speer, popular columnist of the Pittsburgh Sun-Telegram. His comment was as follows:

I hope this won't leave you cold. It's about ice. For about 74 years now there has always been an ice truck in Pittsburgh with that polar scene on it. You've seen it many a time. It is the trade mark of the Consolidated Ice Co. It pictures a polar bear, a huge block of ice and a hunter. It was originated first for the Chautauqua Lake Ice Co. This company was founded in Pittsburgh in 1875 and was one of two companies which were merged in 1899 into the Consolidated Ice Co.

The other was the Eureka Ice Co. of the late Capt. Tom Reese and Thomas A. Dunn. The Eureka was an ice manufacturing company. It used to be on First St. and Duquesne Way. It was the first ice manufacturing plant west of Philadelphia. The Chautauqua Co. was a natural ice company. They cut ice from Conneaut Lake, Ligonier, Stoneboro, Lakeville, Ohio, and Chautauqua Lake. But this cutting ice from lakes and rivers was abandoned in 1916.

In the old days, before trucks, ice was hauled in wagons. They were made in Pittsburgh, back about 1897 by the H. Lang Wagon Co. The company was a large wagon and carriage-making firm, located on Second Ave., downtown. And at the Consolidated's plant at Thirteenth and Pike Sts. today there is still an ice wagon. It's a little one. It was made for H. Stewart Dunn, now president of the Consolidated, when he was a little boy.

Is there still much ice used here? Plenty. It depends on whether it is a hot or cool year. Last year, 1948, was a cool year in the ice business, but even so the Consolidated Ice Co. delivered 25 million pounds of ice in paper and canvas-treated bags. The company has five plants in Pittsburgh. They can make 500 tons of ice a day. In addition, the company maintains an ice storage home. In it is usually kept 3000 to 5000 tons. They have to keep the temperature there at about 20 to 24 degrees above zero. The storage house is filled in the fall months for winter use, and in the spring they put in fresh-made ice.

For a hot year in the ice business, it takes a period of about 30 days when the average temperature is in excess of 85 degrees, during the months of June, July and August. And the ice company has come up with something new, of which it is planning to use more in 1949. It's ice by vending machine. You put a coin in the slot and out comes 10 pounds of ice cubes in a paper bag. Which means we have come a long way from those days of old when the iceman, fish man and hucksters of all kinds drove their wares in wagons from house to house.

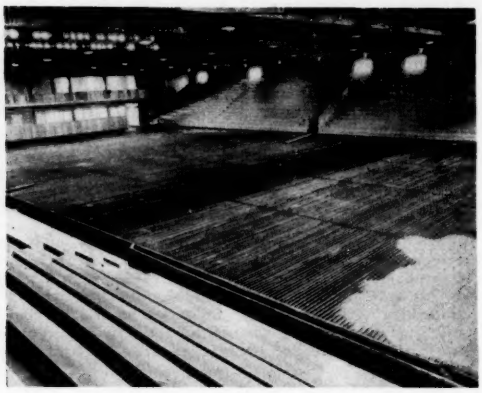
New Ice Advertising

A STRIKING message in brilliant color urging more women to use genuine ice appeared in the June issue of the Ladies Home Journal, sponsored by the Public Relations Department of the National Association of Ice Industries. Against a back-drop of a huge, transparent cake of real ice, the household, social and commercial uses of ice are illustrated and reasons why it is the best refrigerant are given.

The same idea of a transparent cake of ice is used in a full-page, full-color advertisement in the May 21 issue of the Saturday Evening Post. It presents fresh foods "in all their healthful goodness" and shows pictures in the natural colors of vegetables, fruits and drinks. The theme of real ice being best for household, social and commercial uses is repeated.

The campaign to publicize and popularize ice among commercial users continues with a black-and-white advertisement in restaurant, hotel, beverage and food store trade magazines, pointing out that ice made by the ice companies is better in every way and costs less.

Ice Skating Arrives in Albuquerque



First indoor ice rink in Albuquerque, N. M., is shown above as it neared completion. About 45,000 ft. of wrought iron pipe coils are used to form an ice surface 80 ft. wide by 180 ft. long. A balanced system of brine distribution is employed in the rink's operation; brine is circulated only once across the rink and returns in headers around the perimeter to the chiller. A suction arrangement draws the brine from the floor and forces it to the coolers. Flow back to the coils is mostly by gravity. The wrought iron pipes are laid on concrete curbs and sand. There are six headers with 90 grid pipe runs per header. Cooling is accomplished with Freon compressors. Two 60 hp and one 25 hp compressors are used in the winter and a 60 hp compressor is added for summer operation. The rink, operated by Ice Arena, Inc., is used for public skating, sports and ice shows.

Check Sodium Fluoride in City Water as Cause of Ice Brittleness

AFTER complaints of ice manufacturers that sodium fluoride recently added to the city water supply at Charlotte, N. C., as a deterrent to tooth decay is producing brittleness in manufactured ice, city health authorities on May 21 announced a 60-day suspension in the use of the chemical. During the 60-day period it is kept out of the water supply, the ice industry will have an opportunity to institute remedial measures, if fluoride is determined as the cause of the brittleness.

Health authorities said there is no previous experience of fluoride causing ice to shatter in other cities where it has been tried, and that those in charge of the experiments at Charlotte are at a loss as to why ice there started shattering soon after the injection of fluoride in the city water.

During the suspension of the use of fluoride, inquiry regarding its effects in other cities where it is being used in the water supply will be made, and all possible scientific data will be collected both by the ice industry and the Charlotte health department.

Receiver for Ice Company

A RECEIVER has been appointed for the Boonville Ice & Storage Co., Boonville, Ind. The appointment resulted from an application filed by the Althoff-Howard Electrical Co., of Evansville, a creditor of the firm, which recently obtained a judgment. Edward A. VonArb, of Boonville, was named receiver.

Iced Tea Has a Birthday

THE forty-fifth anniversary of the discovery of iced tea was celebrated in St. Louis on June 3 by the Tea Bureau with a re-enactment of the original event.

According to H. Edward Lawrence of New York, one of the country's leading tea industrialists, iced tea was first made during the St. Louis Exposition of 1904. An elaborate exhibit was opened at the fair to promote the sale of India and Ceylon black teas. By the time the fair closed, iced tea was launched as a national beverage.

The re-enactment took place on the same fair grounds where the Royal American Shows, America's largest mobile carnival, is playing. Authentic details in costuming and background were part of the festivities and the ceremony was attended by Missouri dignitaries and personalities. Prior to the ceremonies, a regional luncheon meeting of the tea and grocery trade was held at 12:30 at the Hotel Statler in St. Louis.

The Tea Bureau extended a cordial invitation to St. Louis citizens who attended the 1904 exposiiton to be their guests for the event. Missouri's Iced Tea Day is the focal point for a series of regional events which have taken place around the country in behalf of iced tea.

A St. Louis Iced Tea Queen was selected and appeared at both the luncheon and the fair ground ceremonies.

Indiana Merchandising Forum

THE newly organized Ice Merchandising Forum of the Indiana Association of Ice Industries held its first meeting Tuesday June 28 at the Lincoln Hotel in Indianapolis. This Forum was organized in conformity with the nation-wide forums formulated by the Personnel Training and Marketing Department of the National Association of Ice Industries, to provide circulation of merchandising information to and from the unit associations.

Featured on the program was Dan Prager, director of the Personnel Training and Marketing Department of the National Association. Mr. Prager outlined the overall program of the National Ice Merchandising Forum and covered essential elements of employee selection, employee training and employe relations.

On June 9 the Merchandising Committee met with the sub-committees of the Indiana Ice Merchandising Forum to plan for future activities.

Association officers expect to make this organization the outstanding Forum in the nation-wide program.

Health Board Approves Regulations for Crushed Ice

THE CITY health board of Tulsa, Okla., has approved a new schedule of regulations affecting handling of crushed ice by the 12 ice plants in Tulsa, James P. Slater, city sanitary engineer, announced recently. Crushed ice, the regulations state, must be handled in single-service paper bags, or in cloth bags that must be washed daily. The ice is not to be exposed to dust or dirt and no multi-use bags can be left in business establishments not operated by the plants.

New Ice Company Employees' Magazine

THE Big 10 Ice Companies with home office at Richmond, Ky., has inaugurated a new employees' magazine "The Iceogram" which will be published every sixty days. It is the intention of the company to make this new magazine a publication which the employees will find interesting as well as helpful in their work. Mrs. Jane E. Rutledge is the editor.

Refrigerated Warehousing Industry

NEWS • ARTICLES • ANNOUNCEMENTS

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

Executive Offices:
Tower Building, Washington 5, D. C.

Secretary, W. M. O'Keefe
Executive Vice-pres., Wm. Dalton

President, Arthur N. Otis
New York, N. Y

Vice-president, Fred F. Alford
Dallas, Tex.

Treasurer, J. L. Gagini
Omaha, Nebr.

Industry Advisory Committee Meets With Munitions Board

AT the first meeting of the Munitions Board, Packaging, Storage and Materials Handling Industry Advisory Committee, held May 18 in Washington, Albert B. Drake, American Warehousemen's Association, Washington, D. C., was elected Industry Chairman. Government Chairman for the group is Brigadier General E. Montgomery, Chief of the Supply Group, Logistics Division, Army General Staff.

The first meeting was given over largely to organization of the committee and discussion of problems on which it will be expected to advise the Munitions Board and the military services. Chief among these is the development of military warehousing, packaging and storage practices which will be closely in line with latest commercial techniques, in order to simplify and speed up materials handling. The committee also will coordinate the work of other industry groups which are studying these problems.

In addition to electing a chairman, the committee appointed task sub-committees on training, warehousing, materials handling, refrigerated warehousing, stevedoring, and packaging.

Low Temperature Research

A STUDY of low temperature psychrometry, conducted as a Refrigeration Research Foundation project at Northwestern University under Prof. B. H. Jennings, includes calibration of psychrometric instruments. Latest report includes a brief description of apparatus used and particularly of the method used to saturate air under low-temperature ice conditions. A report will be prepared later on tests of types of instruments, and as testing proceeds experimentation will be carried out on several of the types to determine accuracy and speed of response.

New News Release Letterhead

Cold Facts from the
NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES

FOR RELEASE _____ TOWER BUILDING WASHINGTON 5, D. C.

A new letterhead for news releases has been designed by the National Association of Refrigerated Warehouses. From now on all news items sent to members will appear under the new heading reproduced above, reduced from seven inches wide.

Group Insurance for N.A.R.W. Members

THE National Association of Refrigerated Warehouses has been investigating the possibility of sponsoring a group health, accident, and/or life insurance plan for employees of members. Several such plans, it is stated, are available from some of the larger insurance companies. The plan would be operated through the National Association office and a board of trustees set up by the association.

It is anticipated that dividends would be more than sufficient to cover the costs of operating the plan. The principal of such a plan is the lower premium rates of group insurance and the added security and piece of mind it brings the employees. The executive committee has authorized the association to ascertain the wishes of the members on this question and to present a plan based on these expressions.

Specific Heat of Foodstuffs

A COMPREHENSIVE report (covering a year) from a Refrigeration Research Foundation project, (specific heat of foodstuffs as related to content of water, soluble solids and fat, University of Texas, Austin, H. E. Staph, leader) states that 21 foods have been analyzed and 14 have been studied for specific heat at temperatures from —40 to plus 40 F. Numerous problems have been encountered, for example that of preventing meats from absorbing kerosene in the calorimeter bath. Data taking for each foodstuff requires 2 weeks, and calculations from 1 to 1½ weeks.

Training Conference in Canada

ANOTHER successful training conference was held by The Refrigeration Research Foundation in Kelowna, B. C., Canada, May 2-5, with an excellent registration and attendance of 128 Canadians and about 25 from the United States. Of the 12 discussion leaders, four were from the Dominion Experimental Farm at Summerland, Canada, or from Canadian industry; three were from California or Washington companies; three from the United States Department of Agriculture and two from state experiment stations. The Okanagen Federated Shippers Association provided for local arrangements. Mayor Hughes-Games of Kelowna and Board of Trade President Fred Gisbourne welcomed the conference. A. K. Loyd of B. C. Tree Fruits Ltd., addressed the banquet on "Ancient Days of British Columbia."

Refrigerated Warehousing Industry

Comparing Fiber and Wooden Egg Cases

By Stuart E. Wright and Kirby M. Hayes

Marketing Specialist and Food Technologist, Poultry Branch, U. S. Dept. of Agriculture

Fiber egg cases, introduced during the war, have not been wholly accepted by all refrigerated warehousemen. To provide an answer as to the quality of their performance, as compared to wooden egg cases, this survey was undertaken by the U. S. Department of Agriculture.

THE STORAGE of shell eggs in wooden and fiber egg cases in cold storage warehouses offers opportunities for comparisons of the efficiency of the two kinds of cases. During the war, fiber egg cases were widely used because of a shortage of wooden cases. Often the former were reported to give unsatisfactory service and, despite claims of improvement by many manufacturers of fiber egg cases, some merchants have been reluctant to continue the exclusive use of them. This fact was emphasized by the recent ruling of the Chicago Mercantile Exchange, which states that all lots of eggs set aside for future delivery must be stored in wooden cases.

It was believed, therefore, that a survey including a close-up inspection of both wooden and fiber cases containing eggs in storage, together with a determination of preferences among warehouse personnel and the reasons for such preferences, would be of value to those in the industry. During 1948, specifications were materially changed to strengthen the construction of fiber egg cases for rail shipment. The fiber cases surveyed in this report were manufactured before cases made of the new specifications appeared on the market.

Scope of Survey

The study was conducted jointly by the Fiber Box Association and the Poultry Branch, Production and Marketing Administration, United States Department of Agriculture. During the period from August 17 to September 20, 1948, examinations were made of many thousands of wooden and fiber shell egg cases that were stored in 18 of the larger cold storage warehouses located throughout the East and Middle West.

Objectives

Important facts to be ascertained from this survey were: (1) Condition of the wooden cases in storage, (2) condition of the fiber cases in storage, (3) condition of each type and style of fiber cases in comparison with other types and styles in storage, (4) reasons given by warehouse personnel for their preferences for wooden or fiber cases, and (5) reasons given by warehousemen for their objections to either wooden or fiber cases.

Survey Procedure

A survey team, consisting of an engineer representing the Fiber Box Association and one or more representatives of the Poultry Branch, Production and Marketing Administration, United States Department of Agriculture, visited each of the 18 warehouses.

In talking with the personnel in each plant, the interviewers followed form I rather closely, to obtain background data in order to evaluate better the various specific problems and conditions existing in each of the storage rooms that were subsequently inspected.

Form I covered plant capacity and size, handling practices, labor, handling equipment, sanitary practices, storing conditions, whether fiber or wooden cases were preferred, what types, makes and styles of fiberboard cases were preferred, what make holds up most poorly, specific objections to fiberboard cases for storage purposes, how fiberboard cases for storage use can be improved, how they protect eggs in transit compared with wood, whether or not good used wooden and fiber cases are accepted in storage, whether they are ever mixed in storage, the number of cases piled on a loading truck, average relative humidity maintained in the storage rooms and the height of the rooms.

Form II was used to record more specific information such as the condition of the cases and the dimensions of the cases and thickness of case parts. For this particular kind of information, five wooden cases in one lot in each warehouse were calipered to obtain the variations in dimensions and thickness of parts. For these five cases, information on the nailing, warping, splitting of the wood, and accuracy of assembly was recorded. Fiber cases, however, were subjected to closer scrutiny. Measurements were taken of at least one of each lot of all the different fiber cases in each room, the identification marks recorded, samples of material obtained, and the number of ply used in construction were reported. Notes were made of any bulging or sagging, at what levels the bulging began, and the effect of dunnage on the bottom cases.

DISCUSSION OF FINDINGS

Case Preference

Most of the personnel of the various warehouses stated that they preferred wooden cases. Their reasons for this preference were that such cases: (1) can be stacked higher with greater safety than can fiber cases, (2) take less time to stack, (3) require less dunnage, (4) stand up longer in storage, (5) are more damage-proof, and (6) allow more ventilation than do fiber cases.

Their objections to fiber cases were many and varied. Five of the most common objections were as follows; Fiber cases (1) have a tendency to bulge and sag when piled because the material of which they are made readily absorbs moisture, (2) lean and prevent proper air circulation within the case when stacked, (3) account for a great waste in storage space because they cannot be safely piled as high as wooden cases, (4) cause stacking difficulties because of lack of uniformity of size and design, and (5) collapse if they are second-hand or used cases.

Type of Fiber Cases Preferred

In regard to their preference between corrugated and solid fiber cases, most of the persons questioned said that they had no preference. It was interesting to note that some of the warehousemen favored certain features of both types, such as the center or end tuck-in flaps in certain solid fiber cases and the asphalt laminated material used

in a corrugated case construction. Others favored stapling along the side of some corrugated cases; still others preferred the smooth side of certain solid fiber cases.

Style of Fiber Case Preferred

With reference to the style of fiber case construction preferred, a majority of the personnel interviewed expressed a preference for cases having covers with center or end tuck-in flaps. The reason given for this preference was that such cases were easy to open, thus facilitating the inspection of the eggs. General approval was given a case with a partially telescoped cover, the regular slotted case, and the special center-slotted case. Favorable comment was made about a corrugated fiber case constructed with asphalt laminations for it was believed that such a case had good moisture resistance as it appeared to retain its rigidity under high humidity storage conditions.

Protection of Eggs in Transit Afforded by Fiber Cases

Warehousemen generally rated fiber cases as giving fair to good protection to shell eggs in primary transit. Two of them rated fiber cases as poor in this respect, one because of his wartime experience with fiber cases and the other because he believed that too much "give" in these cases resulted in some crushing of eggs in transit. Other comments were that fiber cases were more difficult than

TABLE I—SUMMARY OF PREFERENCES AND OPINIONS OF PERSONNEL OF COLD STORAGE WAREHOUSES, AS EXPRESSED IN A SURVEY ON THE MERITS OF FIBER AND WOODEN EGG CASES

Whse. No.	Kind of case Preferred	If Fiber cases are used, type preferred	Style of fiber case preferred	Storage Protection given by fiber	Protection of fiber as compared with wood in transit
1	Wood	Solid	Top & bottom-hinge center lock; RSC*, stapled along side, or stapled along side overlap.	Good	Better
2	Wood	Some Solid features; Some Corr. features.	Wrap around; hinge center lock top and bottom; stapled along side.	Good	Equal
3	No Preference	Corrugated	Top & bottom hinge center lock; stapled along side overlap.	Poor	Worse
4	No Preference	No Preference	Fitted telescope with lock top; stapled along side.	Good	Equal
5	Fiber (Labor) Wood (Mg'nt.)	Solid	Top & bottom-hinge center lock; stapled along side, or stapled along side overlap; or top—RSC*, bottom long center lock.	Good	Better
6	No report	No report	No report	No report	No report
7	Wood	No Preference	Hinge-lock top.	Good	Equal
8	Wood	No Preference	No comments re preference	Good	Equal
9	Wood	No Preference	Top & bottom-hinge center lock; stapled along side, or stapled along side overlap.	.....	Worse
10	Wood	No Preference	Sides and bottom wrap around; top—special removable end lock.	.....	Equal
11	Wood	No Preference	No Preference	Fair	Worse
12	Wood	Corrugated	End hinge-lock	Fair	Worse
13	Wood	Solid	Hinge-top	.....	Worse
14	Wood	Solid	Top—hinge-lock or RSC*	Good	Equal
15	Wood	Corrugated (Freezurboard)	Top—single hinge end lock; bottom — double strength RSC* and bottom of partition.	Poor	Worse
16	No Report	No Report	No Report	No Report	No Report
17	No Report	No Report	No Report		
18	Wood	Corrugated	Top—RSC*; bottom—long center lock.	Good	Equal

* RSC—Regular Slotted Construction.

wooden cases to handle by teamsters when being taken out of storage and that there should be no mixed loads (wooden and fiber cases), either in or out of storage.

Preferences indicated by personnel of cold storage warehouses for kind of case, type of fiber case, and style of fiber case, and opinions as to degree of storage protection given by fiber, and protection of fiber as compared with that of wood in transit are listed in Table I.

Improvement of Fiber Cases

Suggestions for the improvement of fiber egg cases may be summarized as follows: (1) Manufacturers should produce a stronger, more moisture-resistant case, (2) more air holes should be made available for ventilation, (3) construction should be uniform with regard to design and size, and (4) a case that will not sag or buckle when piled in eight tiers should be manufactured. Other suggestions favored a multi-trip case, a cover that would require no taping, and a case with stronger hand grips.

Variance in Size of Fiber Cases

Outside measurements of fiber cases emphasized the wide variance in size among the different makes. The outside length of cases ranged from 23¾ in to 26 in., the width varied from 12 in. to 12 5/16 in., and the height from 12⅝ in. to 14 3/16 in. Some of the variations in size were apparently due to the number of layers of material used in constructing the case and the variations in thickness of the material itself.

General Storage Condition of Fiber Cases

Many factors, such as height of stacking and use of dunnage, must be taken into consideration in properly analyzing the general condition of fiber cases in storage. Approximately 11 per cent of the cases surveyed were fiber and it was estimated that 60 per cent of them showed some bulging or sagging which was more apparent in the lower tiers. Those cases that were taped along the top edges seemed to show more rigidity than those not taped and it was observed that more cases had a tendency to bulge at the sides than at the ends.

The "criss-cross" method of stacking was used generally and it appeared that the rigidity of the stacks was improved by those few warehousemen who placed stripping or dunnage between all cases. In some bottom-layer cases, the stripping used had cut into the bottoms of the cases. Wider stripping and more of it, as used in some of the rooms, prevented much of this damage. When cases were piled too high, the weight of the upper cases caused the lower ones to bulge and sag as all cases gradually absorbed moisture from the humid storage air. This condition resulted in reduced air space in each case as the stacks began to lean. A few of the cases were in such a collapsed condition as to afford practically no protection to the eggs, but some of these had, admittedly, been used cases. Only a few cases revealed torn hand grips.

Variance in Size of Wooden Cases

Wooden cases showed less variance in size than did the fiber cases. The outside length varied from 25¾ in. to 26¼ in., the width from 11 13/16 in. to 12 5/16 in., and the height from 12 5/16 in. to 13⅜ in. The thickness of the veneers usually averaged about 1/32 of an inch under standard dimensions (standard thickness for veneers—3/16 of an inch). This fact makes it appear that specifications are either not always rigidly followed or are misinterpreted at the mill.

General Storage Condition of Wooden Egg Cases

The results of the survey indicated that wooden egg cases tend to stand up better in cold storage than do fiber cases. In high humidity cold storage, however, wooden cases absorb some moisture. This condition seems to accentuate warping noticed in some veneer cases, causing additional strain along areas already split. Occasional crushed corners gave evidences of rough handling somewhere along the route of transportation between farm and warehouse. Wooden cases, even when piled 12 tiers high, were generally in good condition. Little evidence of fungi or chemical stain was found. A defect that was noticeable was poor assembly. In assembling some cases, nails had been driven in crookedly and partly off into space, thus resulting in weakened joints. Some of the center boards were not properly assembled, thus one compartment contained inadequate space. In most instances, the nailing schedule conformed to standards.

Summary

A resume of information obtained in the survey of fiber and wooden egg cases in cold storage warehouses is as follows:

1—Wooden egg cases were generally preferred by warehouse personnel to fiber cases for storage purposes.

2—Some wooden egg cases were poorly assembled.

3—Fiber egg cases absorb moisture in cold storage warehouses because of high humidity generally prevailing, thus causing a softening of their material.

4—Standardization in size and design and the use of stronger and more moisture-resistant materials are needed in fiber cases.

5—Fiber cases with center or end tuck-in flaps were most popular with warehousemen.

6—Fiber cases give good protection to eggs in transit, and compared with wooden cases are about equal in this respect.

This report summarizes opinions of warehouse personnel as reported to representatives of the U. S. Department of Agriculture. Therefore, the opinions and suggestions given herein do not necessarily represent those of the Department of Agriculture.

The Department, through the publication of this report, does not in any way express a preference for either wooden or fiber egg cases. Both kinds of cases have their particular advantages and disadvantages, depending upon the purpose for which they are intended and the conditions to which they are exposed. In this connection, it is interesting to note that a considerable diversification of opinion concerning case performance was expressed by warehouse personnel in different places and often by personnel in the same warehouse (see Table I). It is hoped, therefore, that as a result of this survey, manufacturers of both wooden and fiber cases will profit from the frank appraisals thus accorded their products, and that this report will serve to stimulate improvements in the manufacture of both wooden and fiber egg cases.

Moss Used for Storage

MOSS STORAGES are reported to be in use in Switzerland and France for fruits, vegetables, flowers and other commodities. The method is based on the ability of damp living moss to regularize atmospheric humidity and absorb gases given off by stored produce. Acetaldehyde, ammonia, and ethylene, for example, are absorbed. The process was developed by a Swiss engineer named Krebser and is known as the Sapek-Leicester system. Moss stores are being introduced into Great Britain, it is reported.

Studies on Preservation of Shell Eggs By Coating with Plastics

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THE preservation of shell eggs by coating them with plastics as investigated by Yushok and Romanoff is reported in Food Research, Vol. 14 No. 2 (March-April, 1949). The authors used three plastic coatings modified with plasticisers and also with small quantities of petroleum waxes. The various coatings were checked under accelerated drying conditions with forced air circulation at 99.5 F. and 35 per cent relative humidity to determine loss of weight (water) and the change in pH of the albumen. The following is extracted from the report:

Dipping hen's eggs in mineral oil or in oil emulsions is an effective method for retarding their losses of carbon dioxide and water vapor during subsequent storage, Romanoff and Yushok (1948). The ability of mineral oil to reduce the permeability of the intact eggshell and thus preserve the fresh quality of the egg content has led to its extensive use in treating eggs destined for storage, in spite of several shortcomings of this treatment. Rosser (1942) observed that immersing eggs in oil prior to storage favors the growth of molds on the shell as well as in the egg. Our preliminary observations indicate, furthermore, that oil treatment does not prevent deterioration resulting from purely chemical changes in eggs whose shells are cracked or checked. A large opening in an eggshell cannot be sealed by mineral oil and presumably permits penetration of fungi and bacteria into the albumen and the yolk, where prolific growth can take place. During cold storage, a cracked egg promotes the growth of molds on the eggs surrounding it, since it not only supports the production of great numbers of spores but also increases the humidity of the air in its immediate vicinity.

For these reasons our investigations on preservatives were extended to the coating of intact and cracked eggs with a solid, continuous film which would be highly impermeable to carbon dioxide and water vapor and which would also present a mechanical barrier to microorganisms. In this connection, synthetic resins with thermoplastic properties were tested as sealing agents. The efficacy of various substances, when added to the resins to impart certain desirable physical properties to the plastic film, was also considered.

The ability of each plastic film to preserve eggs was evaluated by two measurements: (1) loss in weight of eggs, which is essentially the loss of water; (2) change in pH of the albumen, which is related to the escape of carbon dioxide.

Methods and Materials

Over 800 infertile eggs from White Leghorn hens were used. They were selected by candling within six hours after being laid and allowed to stand at room temperature for two hours. They were then immersed individually for a two-second period in the respective plastic solutions, which were also at room temperature. After the excess coating solution had drained from the egg into the dipping beaker, the coated egg was allowed to dry thoroughly on a wire rack, the thin, firm prongs of which contacted the smallest possible surface of the egg. The drying time was about one minute or slightly longer, depending upon the nature of the solvent and the concentrations of synthetic resin and of modifying substances.

Each egg was then weighed to the nearest 0.1 gram and was stored in a forced-draft incubator in which a temperature of 37.5°C.(99.5°F.) and a relative humidity of approximately 35 per cent were maintained. After a 10-day storage period the weight of each egg was taken, and the pH of a five-ml. sample of its dense albumen measured by means of a Beckman laboratory model pH meter, using a glass electrode. The physical appearance of the albumen and yolk of each egg was observed and described.

Cracked eggs sealed with plastics were treated and stored under the same conditions as eggs with sound shells. A uniform crack on one side of each egg, extending from end to end, was made by striking each egg repeatedly with a sharp knife.

Relationship Between Carbon Dioxide and the Keeping Quality of Eggs

An egg, when cooled to room temperature immediately after being laid, is in equilibrium with an atmosphere containing about 10 per cent carbon dioxide, Sharp (1937). This gas gradually escapes until the interior of the egg is in equilibrium with air, which contains about 0.03 per cent carbon dioxide.

If the carbon dioxide in the fresh egg is retained by sealing agents, or if the egg is placed in an atmosphere with a high content of this gas, an increase in the alkalinity of the albumen is retarded and liquefaction of the dense albumen is largely prevented, Sharp (1929), Romanoff and Romanoff (1949). Movement of water from the albumen into the yolk also is inhibited, Smith (1932), and the density of the yolk therefore does not decrease to any appreciable extent. Since the specific gravity of the yolk remains as it is in the fresh egg—that is, very similar to that of the albumen, Romanoff (1940)—there is no marked tendency for the yolk to float to the top of the albumen and stick to the shell membranes. The vitelline membrane, moreover, retains much of its original strength in the presence of a high level of carbon dioxide, Gane (1935).

The beneficial effects of retaining the carbon dioxide originally present in the egg were substantiated by our observations. When applied to a four- to eight-hour-old egg, any one of the coating agents which inhibited the increase in alkalinity of the albumen during subsequent storage, also prevented (1) liquefaction of the dense albumen, (2) increase in the yolk size, (3) decrease in the breaking-strength of the vitelline membrane. None of the eggs, sealed well the day they were laid, developed stuck yolks, even though the eggs were not turned during storage for 10 days at 37.5°C. and then for two months at room temperature (under conditions unfavorable for mold growth). Our tests indicate that infertile eggs, properly coated within a few hours after they are laid, can be expected to maintain their initial quality at high summer temperatures for at least 10 days.

It has been reported that sealing the egg too soon after it is laid is inadvisable, because the amount of carbon dioxide initially present in some eggs may be sufficient to

cause contraction of the mucin fibers and consequent cloudiness of the albumen. In our tests, however, cloudy albumen developed in only a few of the more than 1,000 eggs sealed with plastics or mineral oil four to eight hours after being laid. When newly laid eggs were stored at room temperature for 24 hours before being coated, enough carbon dioxide was lost to change the pH of the albumen to 8.3. Liquefaction of the albumen and swelling of the yolk then took place, in spite of the fact that further loss of carbon dioxide was prevented.

Relationship Between Loss in Weight of Eggs and Alkalinity of Albumen.

Weight lost by eggs during storage is mainly due to the escape of water. This loss parallels the increase in the alkalinity of the albumen. During a 10-day storage period at 37.5°C., a decrease of five per cent or more of the eggs' weight was accompanied by a rise in the pH of the albumen to 9.4 or 9.5. For a given loss in weight between two and four per cent, significant variability in the pH of the albumen was noted. It is possible that these deviations may be due to a differential permeability, among the sealing agents, to moisture and carbon dioxide. On the other hand, when the weight loss of fresh eggs was less than one per cent, the pH of the albumen did not exceed 8.0. This indicates that the sealing agents which are highly impermeable to moisture can be expected to be very impervious to carbon dioxide, as well. The relative effectiveness of the superior coating agents in preserving eggs can be estimated, therefore, by simple weight measurements.

An approximate index of the preservative value of a coating method is provided by comparing the percentage loss in weight from an egg, sealed when fresh, with that from an untreated egg held in the same environment. Under our high temperature test conditions, a plastic-coated fresh egg which loses one-tenth as much weight as an untreated egg can be expected to maintain its original quality about 10 times as long as an untreated egg. If this approximation is applicable to other storage conditions, normal infertile eggs, coated when newly laid, can be expected to have nearly the same quality after a 10-month storage period as untreated eggs held for a one-month period under the same conditions (which must be non-conducive to microbiological growth). Further tests are necessary, however, to determine whether or not the stability of plastic films containing various plasticizers is affected during storage for long periods at low temperatures.

Conclusions

Newly laid eggs coated with films of chlorinated rubber, polystyrene, or polyvinyl acetate lose substantially less carbon dioxide and water during storage than untreated eggs. Ability of chlorinated rubber and polystyrene to preserve fresh eggs is improved by inclusion of either dibutyl phthalate or n-butyl stearate in the plastic solutions. The preservative value of these plasticized resins is somewhat increased by small amounts of petrolatum and microcrystalline wax. Inclusion of cetyl pyridinium chloride, an effective inhibitor of mold growth, does not decrease the sealing ability of plastic coatings.

Cracked eggs are as effectively sealed by plastic films as eggs with sound shells. Dipping cracked eggs in mineral oil does not decrease their perishability.

The change in appearance of the yolk and albumen in eggs coated when less than eight hours old is closely related to the loss of carbon dioxide and water. For best preservation the plastic coating of eggs should be carried out at the place of production, preferably the same day the eggs are laid. Plastic films, which are non-toxic, tasteless, and odorless, can be formed on eggs by a simple dipping or spraying method, without the use of elaborate equipment. Cost of the plastic materials and modifiers is not prohibitive for practical use.

Warehousemen's Strike in Milwaukee

AT NINE warehouses in Milwaukee the strike of AFL truck drivers, local No. 200 and local No. 815 of the AFL longshoremen, which started May 17, was still in progress the latter part of June. The coolers in these warehouses are used mainly for the storage of apples, oranges and grape fruit. The frozen food warehouses are not involved. The nine companies whose cold storage warehouses are affected by the strike are the Hansen Storage Co., American Warehouse Co., Lincoln Warehouse Co., National Terminals Co., Morton Salt Co., Milwaukee Cold Storage Co., Atlas Storage Co., the Wisconsin Cold Storage Co., and the Olson Motor Service Co.

The original demand by the strikers was an increase of seven cents per hour, but after the strike was on for about two weeks the demand was raised to 15 cents per hour increase, and a guarantee that the 44 hour week would be continued as now in effect. The rates paid at the warehouses now range from $1.13 per hour for dry storage to $1.23 for workers in the cold storage plants. A number of non-union plants in Milwaukee are not affected by this strike. According to one member of the association, there had been no strike for about five years. After the drivers' strike was under way for a while, the engineers decided to go out on a sympathy strike, and at this writing they are still out.

When the strike was in its second week, the plant operators told customers that they could come and get their possessions, but the other employees of the plants saw to it that there was no spoilage.

After the first week of the strike several of the struck plants appealed to the labor board for action, and later an attempt was made to arbitrate the strike but without result up to the third week in June. The plant operators called the strike illegal and accused the unions of failure to hold a legal vote before calling the strike. Later the companies offered to meet the strikers' demands as to working hours but no wage boost.

During the fifth week of the strike operations at other plants were threatened, including the Borden company's ice cream division and the Badger Cold Storage Co. the latter leasing about 80 per cent of its plant to Borden.

Montreal Refrigerating & Storage Shows Increased Profits

IN A report for the year ending December 31, 1948, Montreal Refrigerating & Storage, Ltd., Montreal, Canada, shows net profit of $146,250, against $82,706 in the previous year. Profit is equal to $3.57 per share on 37,000 shares of common stock, after preferred dividends, against $1.77 per share on 35,625 shares at the end of 1947.

There were 5,404 preferred shares redeemed during the year, leaving 6,491 outstanding at the end of the year and dividends at the rate of $1.50 per share on the preferred stock required $13,910 against $17,842 in 1947. Dividends paid on the common amounted to $1.25 per share, requiring $46,250 against 30 cents per share in 1947. After dividends, surplus carried forward stood at $41,870 against $74,120. Depreciation allowance was $28,130 against $29,729 and income tax provision was $86,170 against $72,236. The balance sheet shows current assets of $114,430, including cash of $39,720 and receivables of $74,710. Current liabilities were $80,290 indicating net working capital of $34,140 against $56,498 in 1947.

Cold Storage Holdings—Cooler Space Slightly Up, Freezers Down

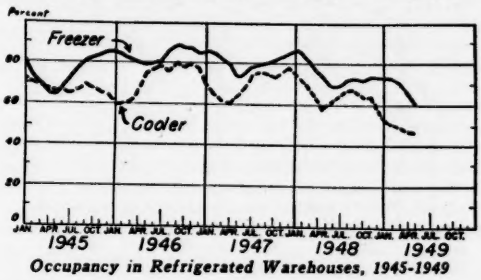
THE U. S. Dept. of Agriculture reports that cooler space in public refrigerated warehouses was 49 per cent filled on May 1. The increase of 1 point in occupancy during April was 2 points less than the average April to May change and the increase in occupancy last year. During the 5-year period ended 1948, May 1 occupancy in coolers averaged 70 per cent; this time last year only 62 per cent of the space was filled. In the New England, Middle Atlantic and Pacific regions, cooler occupancy was below the national average.

TABLE I—COLD STORAGE HOLDINGS IN PUBLIC WAREHOUSES—BY COMMODITIES (000 OMITTED)

	May 1, 1949	April 1, 1949	May 1, 1948	Five-year Average
Meat and meat products, lbs.	793,755	860,786	851,447	744,899
Lard and rendered pork fat, lbs.	138,278	156,782	138,924	177,952
Frozen poultry, lbs.	89,385	108,732	153,424	173,260
Creamery butter, lbs.	15,131	6,318	4,449	28,422
American cheese, lbs.	110,281	105,608	91,907	97,494
Other cheese, lbs.	14,592	12,802	11,754	17,191
Shell eggs, cases	962	530	3,091	4,409
Frozen eggs, lbs.	106,989	77,319	195,954	187,513
Apples, bu.	3,324	5,491	4,896	3,625
Frozen fruits, lbs.	237,140	266,581	247,895	231,708
Frozen vegetables, lbs.	190,790	205,061	176,118	150,897
Frozen fish	13,659	13,601	16,198	17,782

Public freezer space was 6 per cent less occupied than last month. May 1 occupancy of 60 per cent reflected seasonal withdrawals of freezer commodities from storage during April. The decline of 4 points compares with a 5 point change last year and an average decline of 4 points from April to May. By comparison, the occupancy reported on May 1 was 10 points below the level reported last year and was as much as 14 points below the average occupancy reported for May 1 during the last five years. Private and semi-private warehouse operators reported coolers and freezers were 44 and 53 per cent occupied, respectively. In the case of coolers this was a 3 point decrease and for freezers a 4 point decrease.

The net weight of foodstuffs in storage on May 1 totaled 2.5 billion pounds, a decrease of 232 million pounds from last month. May 1 holdings were below the stocks on hand this time last year by 313 million pounds. Approximately half of the stocks in storage were cooler items of which nuts, nutmeats, cheese, shell eggs, dried eggs, sausage, and canned meats showed seasonal increases during April. All other items were withdrawn from storage during the month. Such freezer-held commodities as frozen fruits, vegetables, poultry, beef, and pork were withdrawn from storage in the total amount of 102 million pounds. The net increase of cream, butter, and frozen eggs held net withdrawals from freezers to 85 million pounds which compares with a net decrease of 143 million pounds during April, 1948.



Occupancy in Refrigerated Warehouses, 1945-1949

Fresh apples in storage totaled 3 million bushels on May 1. Stocks in the Pacific region accounted for almost 70 per cent of total holdings. The net reduction of 2 mil-

TABLE II—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu. ft.)		May 1, 1949 (%)		April 1, 1949 (%)		May 1, 1949 (%)		5-Year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	3,561	6,327	42	58	37	63	52	57	68	64
Middle Atlantic	42,086	33,798	40	52	40	59	55	64	66	76
East North Central	36,040	28,304	52	62	51	64	66	77	71	75
West North Central	11,006	16,733	53	69	54	74	72	84	77	76
South Atlantic	11,634	6,368	54	77	50	79	69	74	74	81
East South Central	4,199	3,647	65	81	65	86	78	79	83	75
West South Central	7,241	5,195	73	60	73	57	72	72	78	80
Mountain	2,150	2,707	71	63	57	70	79	83	84	84
Pacific	18,936	21,462	46	53	44	55	55	58	82	65
United States	136,853	124,741	49	60	48	64	62	70	70	74

TABLE III—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PACKING PLANTS

	Private and Semi-Private Warehouses						Meat Packing Establishments					
	Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent May 1, 1949		Space Occupied—Per Cent April 1, 1949		Ner Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent May 1, 1949		Space Occupied—Per Cent April 1, 1949	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	554	1,113	39	63	30	79	1,968	725	81	.....	88	100
Middle Atlantic	3,293	4,430	42	59	36	52	6,731	740	90	80	78	64
East North Central	5,779	2,576	56	44	80	53	15,885	6,591	90	63	89	62
West North Central	2,123	3,929	91	66	72	75	25,718	10,549	88	91	90	86
South Atlantic	647	1,377	12	77	17	72	2,377	609	95	99	95	98
East South Central	190	101	100	.....	100	.....	2,014	403	85	91	84	89
West South Central	700	764	40	11	37	14	3,570	1,452	100	100	100	98
Mountain	182	654	90	31	84	39	2,028	666	98	100	98	100
Pacific	5,383	6,554	14	46	15	52	4,056	1,152	94	84	94	97
United States	18,851	21,498	44	53	47	57	64,347	22,887	90	80	89	81

lion bushels during the month was 3 million bushels less than the April, 1948 withdrawals. Such fresh vegetables as potatoes and onions were reduced by 9 and 36 million pounds, respectively, during April. Holdings of potatoes amounted to 78 million pounds; onions, 35 million pounds.

Frozen fruits in storage totaled 237 million pounds or 29 million pounds less than stocks on hand last month. The reduction was about average for this time of year. First-of-the-month stocks, below those of last year by 11 million pounds, did exceed the average by 5 million pounds. About half of the total stocks in storage was in the Middle Atlantic and East North Central regions. Withdrawals of strawberries were above average accounting for more than half of the net reduction in total stocks. Frozen fruit juices and purees showed a significant increase during the month.

Frozen vegetables in storage in May amounted to 191 million pounds. In storages located in the Middle Atlantic and Pacific regions, about 64 per cent of the stocks were stored. The former held 36 per cent. Withdrawals of green peas, corn, and lima beans in total amounted to 17 million pounds; frozen spinach holdings increased by 6 million pounds during the month. Total holdings on the first of this month exceeded last year's stocks by 15 million pounds and were 40 million pounds greater than average.

May 1 holdings of cream were below average by 6 million pounds. The 11 million pounds in storage exceeded last year's stocks by 3 million pounds. The net in-to storage ment of 2 million pounds compares with an average net increase of 5 million pounds.

Butter stocks totaled 15 million pounds. Last year this time only 4 million pounds were in storage. First of the month stocks increased by 9 million pounds since April 1, the second largest movement for this time of year since 1943. Compared with the May average, however, butter stocks were 13 million pounds below average.

May 1 holdings of 962 thousand cases of shell eggs and 107 million pounds of frozen eggs were below average for this date. Shell egg holdings were below average by 3 million cases and frozen eggs by 81 million pounds. Cheese, all varieties totaled 126 million pounds, an increase of 6 million pounds since last month. American cheese stocks at 100 million pounds were 13 million pounds above the May 1 average.

Less poultry was withdrawn from storage during April than last year. Withdrawals of 19 million pounds compares with 52 million pounds withdrawn during April 1948 and the average April to May change to 42 million pounds. The net reduction in holdings left 89 million pounds in storage on May 1, the second lowest on record for this time of year since 1940 withdrawals of fowls and turkeys accounted for 13 million pounds.

Total meats in storage on May 1 totaled 794 million pounds. While above average for this time of year, stocks fell below those on hand last year this date by 57 million pounds. Holdings of beef at 108 million pounds reflected an out-movement of 19 million pounds. Withdrawals were above average by 7 million pounds. Pork on hand amounted to 547 million pounds, of which 303 million pounds were frozen. The decrease of 39 million pounds since April 1 compares with 54 million pounds withdrawn this time last year and the average withdrawals of 23 million pounds. Lard and rendered pork fat stood at 138 million pounds on the first of this month. A contra-seasonal movement of stocks was reflected by a net-withdrawal of 19 million pounds. The average April to May change was an increase of 18 million pounds.

A net decrease of 8 million pounds during April left 75 million pounds of fishery products on hand May 1. These holdings were above stocks on hand this date last year by 7 million pounds, and exceeded the May average by 15 million pounds. Of the total in store, 56 million pounds were salt-water species, 7 million pounds fresh-water species, and 12 million pounds, shellfish.

Storage Outlook

The increase in public cooler occupancy during the month was the smallest on record. The rise of one-point compares with an average increase of 3 points in cooler occupancy from April to May. At the present occupancy, coolers were operating 21 points below average and were at the lowest May level since 1941. The movement of shell eggs into storage has been relatively light, which is largely responsible for the low level of occupancy now in evidence. Should the seasonal increase in occupancy during May equal the average, which is 2 points, then on June 1 coolers will be a little more than half filled.

Freezers were probably at their seasonal low on the first of this month. Utilization of only 60 per cent of the net piling space was a near record low, being second only to the 55 per cent recorded on May 1, 1940. Consistently below average each month from January 1 last, monthly occupancy in public freezers, however, has followed the seasonal pattern described by the 5-year average in its change from month to month. The expected movement of butter, frozen eggs, and cream products into storage during May should raise freezer occupancy by as much as 2 and possibly 3 points.

Cold Storage Stocks of Frozen Fruits and Vegetables

THE percentage of frozen fruits and vegetables classified as to container size was about the same as last month according to a report by The Production and Marketing Administration of the U. S. Dept. of Agriculture. Approximately 70 per cent of the 64 million pounds of peaches, raspberries and strawberries in storage on May 1 were classified as to package size. The ratio of consumer-sized packages to larger cartons also showed little change. The percentage of peaches and strawberries in retail containers each increased 2 points to 33 per cent and 13 per cent, respectively, while strawberries decreased from 26 per cent to 23 per cent.

COLD STORAGE STOCKS OF FROZEN FRUITS AND VEGETABLES IN STORAGE MAY 1 AND APRIL 1, 1949 IN PACKAGES OF ONE POUND OR LESS (000 OMITTED)

	May 1, 1949		April 1, 1949	
	Lbs.	Pct.	Lbs.	Pct.
Peaches	2,964	33	3,220	31
Raspberries	1,368	13	1,558	11
Strawberries	5,696	23	9,604	26
Asparagus	1,268	54	1,048	51
Beans, lima	11,692	62	12,501	60
Beans, snap	4,523	65	5,850	68
Corn, sweet	3,128	58	3,938	54
Peas, green	18,015	67	21,887	64
Spinach	6,626	71	3,705	74

Fifty-four per cent of the May 1 stocks of the selected frozen vegetables, which totaled 129 million pounds, were classified by warehousemen as to container size. Of the 70 million pounds reported by package size, 65 per cent were in containers of one pound or less. Last year this time a little more than half were reported in retail packages. An increase in the percentage of retail packages of asparagus, lima beans, sweet corn, and green peas in consumer-sized packages over that reported last month indicates a greater movement out of storage of the larger sized packages. Snap beans and spinach, however, showed a decline in the percentage of retail packages with 65 per cent and 71 per cent, respectively. This compares with 52 per cent and 70 per cent reported last year.

Storage of Frozen Milk

COMMERCIAL possibilities of frozen whole milk and its shipment are discussed in a recent fact file sheet issued by The Refrigeration Research Foundation.

Estimates of commercial possibilities of good-quality frozen whole milk vary. The success of the Army, Navy and War Shipping Administration during the recent war in the use of frozen fluid milk (pasteurized, homogenized, cooled, packaged in paper containers, frozen statically in ice cream hardening rooms, held until used at sub-zero F. and defrosted and mixed at room temperature) is often mentioned. Cost of course is high but for export to non-dairy regions and for marine travel, it might succeed. During the war it was held as long as three to four months. Storage temperature is regarded as critical; it must be at least —10 F. and lower temperatures are advantageous as a measure for control of flakiness in defrosted milk. This example of success has stimulated interest in research.

Frozen concentrated skim milk is suitable for commercial use, as in ice cream and other products in which milk products are used. It is preheated to 170 F. for 15 minutes, condensed in the absence of copper contamination at 120 F., cooled to 40 F., packaged in tin or special fiber, frozen rapidly, and stored at —10 F. or below. Storage life is three to four months. The most troublesome problem is the tendency for the protein (casein) to become flaky; this factor is not fully understood. Often in the better product, this flakiness can be dispersed by heat applied to the defrosted product. Bulk frozen concentrated skim milk is being used to some extent, usually in ice cream.

Some experimental work has been done on frozen concentrated whole milk—chiefly aimed at economy and good quality for use in ice cream and other manufactured foods, but also for sale at retail market outlets in consumer packages. The method would be similar to that for frozen concentrated skim milk. Homogenization is necessary. Concentration would be 3 to 1. Storage life would be shorter, only 8 to 10 weeks. Storage temperature would be —10 F. or lower. The critical factor would of course be the flakiness in thawed, reconstituted milk. In consumers' hands reheating to disperse flakiness would not be feasible. Important factors to control rigidly would be pasteurizing temperature, degree of concentration, extent of bacterial action in the fresh milk, and storage temperature.

The information above has been summarized from the review of the subject by F. J. Doan (Pennsylvania State College, State College, Pa.) in American Milk Review for April, 1948. The process for frozen concentrated whole milk is described by F. J. Doan and J. G. Leeder in Food Industries for July 1944. Research is under way by the USDA and some State Experiment Stations. The Refrigeration Research Foundation is aiding cooperatively with the American Dairy Association, a project on frozen milk (TRRF Project No. 31) at the Minnesota Agricultural Experiment Station under Dr. S. T. Coulter.

Research proceeds in such directions as use of stabilizing compounds—sodium citrate, ascorbic acid, pectin, calcium compounds, etc.—and also in the direction of improved methods, particularly for frozen concentrated milk. One writer, commenting on the Doan and Leeder method (as described briefly above), has speculated that frozen concentrated milk, if successful, will eventually streamline milk distribution along such lines as (1) closing of city milk plants, (2) heavy reduction in home deliveries, (3) distribution in single standard weekly packages, and so on. This writer is Andrew Moldovan, in Canadian Dairy and Ice Cream Journal for May '45.

Enterprising business men are now shipping frozen single strength milk to Anchorage, Alaska, by air. Concentration 3-to-1 would cut the cost very substantially, as pointed out by George D. Armerding in Western Canner and Packer for May '49, since air shipping cost from Seattle is 15 cents per pound. Frozen whole milk is also being shipped by steamer to some extent to the Philippines. Mr. Armerding is employed by Mojonnier Bros. Co., makers of low-temperature evaporation equipment, of the type that is succeeding well with orange juice.

Summary

1. Present research progress has shown the necessity of storage at —10 F. for frozen milk products such as frozen whole milk, frozen concentrated skim milk, and frozen concentrated whole milk. Storage period is three to four months, except for frozen concentrated whole milk, for which 8 to 10 weeks is the indicated limit.

2. These products are not produced in significant quantities but research and commercial interest is large, stimulated no doubt by successful concentration of frozen orange juice.

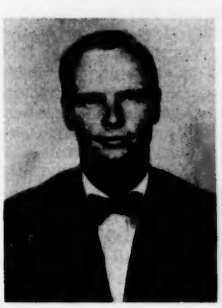
3. Production hazards that would affect storage life include quality of original milk, careful control of temperatures in pasteurization and vacuum concentration, avoidance of copper-contamination, speed of cooling and freezing.

Warehouse Offers to Buy Back Stock

THE Merchants Ice & Cold Storage Co. of Louisville, Ky., is offering to buy back and take out of circulation as many shares of its 6 per cent preferred stock ($100 par value) as $25,000 will buy. All owners of the stock are being invited to set a price on their holdings. Stock carrying the lowest price will be bought next and so on. However, directors have agreed that no more than $110 a share will be paid under this arrangement.

The company has the right to call in preferred stock on payment of $105 a share plus the amount of accumulated unpaid dividends. Past due dividends total $24 a share ($152,328). Though the company has authority to issue 9,000 shares of the stock, only 6,347 shares are out.

Winston Joins Fulton Market



Alfred F. Winston

THE appointment of Alfred F. Winston as vice-president of the Fulton Market Cold Storage Co., has been announced by Vallee O. Appel, president of the company. Mr. Winston had previously been associated with Beatrice Foods in the legal department and in the cold storage division of that company for some years. During the War he was in the Navy as a lieutenant. He is a native Chicagoan, having lived in Chicago all of his 35 years.

California Consumers Report

THE CALIFORNIA Consumers Corporation and subsidiaries, statewide cold storage and frozen foods concern, Los Angeles, reported a loss of $26,351 for the 12 months ended March 31, as compared with a net operating profit of $301,015 for the preceding fiscal year. Total revenues for the 1949 fiscal year were $4,071,996, as compared with $4,885,230 for the 1948 fiscal year.

Storage of Cherries

A FACT file sheet on the storage of cherries, covering temperature and other storage conditions and listing the more serious market diseases has been issued by The Refrigeration Research Foundation.

Sweet cherries from California, Oregon, Washington and Idaho are shipped eastward annually in amounts between 1500 and 2000 carloads, usually by express. If they are held longer than about two weeks in ordinary refrigerated atmosphere, their flavor declines and they lose their brightness of color. Stems dry out and darken, and at a faster rate if humidity is low.

Color changes and decay are reduced by the use of carbon dioxide gas in transit supplied by dry ice, and this method is now widely used. General practice is to use 1,000 lbs. of dry ice placed above load at the brace on a platform constructed on the top spreaders of the center brace. Retention of wrappers makes dry ice last longer. An additional 50 lbs. is placed in each bunker and broken up on top of water ice to give an immediate charge of CO_2 gas. The dry ice is applied at the end of any precooling period just before the car is sealed. The following are experimental data indicating effectiveness of the method, as reported by Fisk Gerhardt and A. Lloyd Ryall in U.S.D.A. Technical Bulletin 631, February, 1939.

EFFECT OF DRY ICE PRESERVATION METHOD

Variety	Temp. F.	Gas Concentration	Storage Period Without Impairment of Flavor (Days)
Bing and Lambert	60°	40%	12
	45°	75%	10 (Bing only)
	45°	40%	20
	45°	25%	17 (Also Royal Anne)
	32°	10%	31

In firmness, brightness, freshness and freedom from decay, CO_2 gas storage at (25 per cent) at 45 F. was found to be preferable to air storage at 32 F. In ice water, cooling of packaged cherries was 145 times as fast as in still air and in air blast it was 1.9 times as fast as in still air, without ill effects, in tests by Fisk Gerhardt and W. V. Hukill.

Surface condensation of moisture or sweating (due to temperature difference in product and air) is particularly troublesome with cherries, because they are one of the more tender fruits and are highly susceptible to mold. It is of course especially marked when the atmosphere to which the cherries are removed is high in relative humidity. Gradual warming up is desirable but not often possible and in damp weather it is well to handle the product in accordance with the risk—that is, as quickly as possible.

Market Diseases (Most Serious)

Blue mold rot: Round spots of mushy decay that can be scooped out cleanly. White tufts turning to bluish-green develop on surface. Musty odor and flavor. *Control:* Prevent skin breaks. Market promptly. Refrigerate promptly to 32 F.

Brown rot: Extensive firm brown unsunken decay, turning dark in center—covered with dusty spores in yellowish-gray masses. Should be controlled in orchard. *Control:* Refrigerate promptly to 32 F. Use of CO_2 from 1,000 lbs. of dry ice per car is further measure of control.

Gray mold rot: Light brown, fairly firm, watery decay covered with delicate dirty-white mold. On completely decayed cherries grayish-brown velvety sporulation may occur. *Control:* Handle carefully. Refrigerate promptly.

Green mold rot: Light-brown, dry, firm decay lining skin breaks. Can be removed easily from surrounding healthy tissue. Mold growth on area is dark green below and white above. *Control:* Cull out cherries with cracks and other skin breaks.

Pullularia rot: Thin extensive decay causing cherry to become sticky. *Control:* Prompt handling and refrigeration to 32 F.

Rhizopus rot: Extensive soft leaking decay with little change of color. Coarse mold growth and black spores prominent under moist conditions. More prevalent in upper layers of car. *Control:* Prompt refrigeration.

Summary of Storage Conditions

Temperature: 31 to 32 F.
Relative humidity: 85 to 90%.
Storage periods: Ten days to two weeks at shipping point. About one week in eastern markets after transcontinental shipment.

Storage of Vegetable Seeds

A FACT file sheet, summarizing information on the storage of vegetable seeds has been issued by The Refrigeration Research Foundation.

Kidney bean seeds at an air relative humidity of 45 per cent reach an equilibrium moisture content of about 9 per cent, whereas at 80 per cent rh they reach an equilibrium moisture content of about 16 per cent. The latter moisture content is too high, of course, and similarly for seeds in general, high relative humidity and related high moisture contents are major causes of loss of viability. The changes within the seed that cause its death take place faster at higher moisture contents and higher temperatures. It's easier to hold humidity and moisture content down if seeds are held in a cool environment.

It's also easier to control insects if temperature of storage is in the range of 40 to 50 F. In fact such temperatures offer positive control of insects.

As an example of loss of germination at higher temperatures, onion seed with an original germination of 94 per cent, when experimentally stored at 80 F. and 80 per cent rh, decreased 12 per cent in germination in three weeks and showed no germination after 12 weeks. The moisture content during storage was 13.2 per cent. After storage at this condition for nine weeks, the particular samples of onion, sweet corn, shelled peanut, and celery seeds used in the experiments were worthless for planting purposes, and there was appreciable to serious loss of viability by carrot, watermelon, spinach, cabbage, pepper, lettuce, okra, cucumber and turnip seeds. Only bean, pea, and tomato seeds showed no decrease in germination in nine weeks.

Unless the seed is to be used at once after removal from storage, the moisture content should be determined and, if the moisture is above the safe limit for the expected temperature, the seed should be dried carefully to a safe moisture content.

Moistureproof containers may be feasible for small lots of seed with low moisture content.

Seeds removed from cold storage should be allowed to reach normal temperatures in a place with low air humidity to avoid condensation of moisture on the cold seeds.

Where air humidity is low and temperature moderate, seeds in sacks stacked to allow free circulation of air will dry out before any serious damage results. It may often be desirable to lower moisture content more rapidly by heated moving air. Seeds spread on screens will dry in a few hours in air at 120 F., but higher temperatures may damage the seed, particularly if it is low in vigor. Most

(Continued on page 60)

The Practical Refrigerating Engineer

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OPERATING • MAINTENANCE • NEWS
QUESTIONS AND ANSWERS

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Refrigeration Equipment for Frozen Food Storage Plants

IS there any uniformity of opinion in regard to the best method of refrigerating freezer storage rooms at —10 F? Where blower actuated refrigerating units are used, when is it better to provide duct distribution of air in such freezer storage rooms?

These two questions (Nos. 812 and 813) were in the NAPRE Question Box last month. To determine whether there was any uniformity of opinion, replies to the questions were requested from manufacturers, engineers and users. Some answers analyzed the questions at considerable length and these are given in the following columns. The shorter replies were printed in the June issue, page 56.

There is no uniformity of opinion on these questions. Blower actuated refrigerating systems were not new in 1895 (Ice & Ref., Jan. 1949, page 26). Now 54 years later, it is still the duty of engineers to consider and evaluate all phases of a particular plant problem and arrive at a conclusion which best fulfills the requirements.

We appreciate the analysis of these questions furnished to us for publication in the present and preceding issues. The following discussion comes from a cold storage operator of broad experience.—H. G. VENEMANN, Chairman, Educational Committee.

Suit Equipment to the Job Requirements

IN designing cold storage facilities for frozen product, the planned operating performance must first be reconciled with the planned investment after which all individual design factors should be agreed upon and firmly established. Intelligent selection can then be made of appropriate materials and equipment for the job. The choice of gravity air circulation coils versus unit coolers should depend entirely upon the established design factors. There is a distinct difference between the two types of equipment in first cost, operating cost and performance. Each has a proper place in cold storage design.

The high velocity air circulation over the cooling surface of a unit cooler results in a high rate of heat transfer and, therefore, the cooling surface required for a given heat load is considerably less than that required with gravity air circulation coils.

A unit cooler installation, whether "wet" or "dry", usually represents a smaller initial investment than a ceiling coil job of equal heat-absorbing capacity. In addition to the higher cost for fabrication on the job, structural strength must be provided in the frame of the building to carry the weight of the ceiling coil; whereas, unit coolers are factory built and the larger sizes are customarily mounted on the floor, needing only to be connected in place.

It is a nuisance, at least, and may be a real task to defrost the ceiling coil. It has the advantage, however, of having no moving parts. The energy required to drive the moving parts on a unit cooler, although relatively small, is a continuous item of operating expense with the expended energy becoming a fixed part of the heat load of the plant. Maintenance and repair expense are incurred and some fire risk is added.

Automatic controls for absentee operation of a ceiling coil are relatively simple, and the operation may be expected to be somewhat more reliable than with a unit cooler controlled to the same degree.

Drying Action

In general, assuming the storage temperature is correct, the deterioration of product carried in freezer storage is a drying out action which may be evidenced by loss of weight, loss of flavor and discoloration. Fatty substance on the surface of product of animal origin may become oxidized and rancid. Under identical storage conditions, some products are more susceptible to loss of quality than others, and the type of pack and method of packaging have a good deal to do with the keeping quality. Obviously, a product hermetically sealed in tin will not transmit moisture to the atmosphere of the storage room. A solid pack of boneless meat, wrapped in wax paper and securely boxed, will not give up moisture as readily as muslin-wrapped veal sides or commercial cases of "New York dressed" poultry.

Within a closed space such as a freezer storage room, there is a natural tendency for the vapor pressure of all substance to reach equilibrium. Substances of higher moisture content will give up moisture to substance of lower moisture content. The transfer is from the stored

product to the air and, subsequently, from the air to the cooling substance or surface. Air circulation accelerates this transfer of moisture. This is fundamental regardless of whether unit coolers or ceiling coils are used. The rate of moisture transfer depends upon the moisture content or relative humidity of the air in the room, the velocity of the air over the stored product or substance of higher moisture content, and the frequency of direct contact between the air and the cooling surface. Prevailing temperature differentials, of course, will largely control the relative humidity. The lowest rate of moisture transfer may be expected with a high relative humidity, the least air movement over the stored product, the least fluctuation of storage temperature, and with limited actual contact between the air and the cooling surface.

Unit coolers circulate all of the air of the room over the cooling surface, in most cases several times per hour. With a ceiling coil job, a large portion of the air in the room is cooled by the colder air mixture around the coil without a ceiling coil job, a large portion of the air in the room is cooled by the colder air mixture around the coil without making actual contact with the coil surface. However, a low first cost ceiling coil installation with wide temperature differentials and inadequate wall and ceiling insulation can cause fully as much storage deterioration as may be experienced with a unit cooler installation.

Low, sub-zero storage temperatures to minus 20 F., have been advocated as a correction of the inherent characteristics of unit cooler-type installations on the theory that the lower temperature air with less carrying capacity for moisture will be less destructive to the stored product. Where a storage service of that kind is required, there is no economic justification for a unit cooler-type job over a properly designed plant with ceiling coils. Ceiling coil jobs have been seriously described as "old fashioned", yet there are numerous competitive commercial installations performing excellently with just a constant freezer storage temperature of Zero F. The excessive cost to provide storage at minus 10 or 20 F., makes it prohibitive for commercial application.

Usage of Plant Determines Design

The type of business that the plant is to engage in will determine the performance required and the design and selection of material and equipment. It may be that the stored product will be carried such a short time that storage deterioration will be negligible and of no serious consequence. There are wholesalers and distributors who want a space where car or truck lots may be received and carried pending distribution. The stock is turned over within a week or two, and there is a high heat load and high moisture load due to the doors being opened continually during business hours. There are packers and processors who want a space where daily production may be delivered and carried a few days or a couple of weeks, pending accumulation of full car or truck lots for shipment beyond. Here also, the doors are open much of the time during operations. A small, commercial cold storage may be planned to be engaged in the short hold storage of frozen product for local merchants. It may be an area where there is little or no competition, the initial investment may need to be held to a minimum, and the trade may be expected to accept some storage deterioration as being "natural." As a rule, it may be said that in cases such as these, a unit cooler installation is indicated.

Contrasting with the foregoing described plants, there are commercial cold storages in competitive areas where facilities are called upon to carry product for a few weeks to several months and even for a year or more without loss of quality, failing which there is risk of claims for damage and loss of the account to a competitor. There are packers and processors who carry their own production seasonally, the inventory value of which may represent a large part of the total assets of the company and on which a loss in value due to storage deterioration could not be tolerated. Banking firms, making loans on warehouse receipts for frozen product, will limit the terms and conditions of loans according to their experience with the product in a given storage. The packer and processor may be using a method of packaging for all of his production which effectively retards moisture transmission and proposes to limit the operation of his storage to that type of business. However, commercial packaging practices are beyond the control of the commercial cold storage operator. In a competitive area, in order to continue successfully in business, he is required to provide proper facilities and services for any and all of the various types of commercial packs which may be offered. For a storage service of this kind, there should be no compromise. A carefully designed ceiling coil installation with gravity air circulation is definitely indicated.

Duct Distribution

Air ducts are used with unit coolers to obtain equal distribution of the cold air throughout the refrigerated space. Air ducts may be omitted when the required overhead horizontal flow is limited to about twenty-five feet, and the ceiling is a clear area with no intereference from projecting joists or beams. When air ducts are used, there is less risk of damaging effects from high velocity air circulation over and through the stored product.—J.A.H.

What Unit Coolers Provide

By C. N. Deverall
Niagara Blower Co., Buffalo, N. Y.

THE selection of equipment to cool this or any other room should be made on an economic basis after requirements and available methods are balanced out. It will be quite obvious that a room of this kind carried at —10 F. will require either equipment which may be defrosted periodically or equipment which will prevent the collection of frost on the cooling surface. The problem, therefore, becomes one of moisture rather than temperature control. Equipment available for this type of operation will divide itself roughly into two types, the "Defrosting type" and the "Non-frosting type."

The problem of moisture suggests several conditions which must be investigated: Length of storage period; condition of product when brought into room; is it packaged, frozen, if not, what is its moisture content and temperature; what moisture loss can be tolerated. These and a number of questions pertaining to the conditions which must be maintained in the room should be considered before any choice of equipment is attempted.

If frozen packaged product is brought into the room on a conveyor protected with automatic air traps, little moisture would be brought in with it. If on the other hand,

unpackaged, unfrozen, product is brought in on trucks, a great deal of moisture would be brought in. The amount should be determined.

At —10 F. it is quite obvious that any defrosting system must be defrosted at regular intervals, and that due to the fact that frost begins to build up as soon as the system is turned on, constant temperature cannot be expected in the room. On the other hand, a Non-frosting system will operate with frost free coils at all times so that it may be operated at a closer temperature difference, higher dewpoint, and at a predetermined and constant temperature, due to this frost free condition.

There are several systems available which would take care of this room as far as temperature is concerned. They could be briefly described as follows:

1—*Gravity System* with refrigerated coils and gravity circulation of air. These coils may be arranged on the ceiling of the room or in bunkers. Due to the low velocity air movement, with this type of coil, a great deal of surface must be supplied to offset the low K factor. These coils start to frost immediately the system is turned on and as the frost builds up the room temperature will rise unless the refrigerant temperature is decreased to compensate for it. Reduction in the refrigerant temperature lowers the dewpoint surrounding the surface increasing the amount of dehumidification that will take place. These coils must be defrosted periodically with hot gas, water spray, or the old system of knocking the frost off and disposing of it by the "wheel barrow" route. Where the frost is melted off provision must be made either to catch the drip from the coil or a clean up gang provided to mop up the floors.

2—*Blower Type Fan Coolers* which are made up of coils over which a current of air is drawn or blown by means of a fan, circulation is more positive and equipment is more compact, but the same defrost problem must be contended with as is the case with gravity coils.

3—*Spray Coolers* in which the refrigerant coils are sprayed with brine, air being drawn or blown through the coil by fan. In this equipment no frost forms on the coils so that they operate at 100 per cent capacity at all times. Due to the fact that the surface is clean at all times, the refrigerant temperature can be maintained several degrees higher resulting in a higher dewpoint at the cooling surface. This in turn decreases the amount of moisture extracted from the air. While these coils need not be defrosted, the brine must be strengthened periodically and a certain amount dumped to get rid of the dilution which takes place through moisture pick up in the spray system. Sodium or calcium chloride brines are used as required by the temperature to be maintained.

It will be noted that the first two systems are Defrosting Systems while the third system is a Non-Frosting system.

4—*No-Frost System* so called to differentiate between this type and the conventional brine systems. This type of equipment follows the general arrangement of the brine spray unit just described. In place of brine an anti-freeze solution with a concentration corresponding to the desired freezing point is used. The anti-freeze used must be of such nature that when combined with a given percentage of water, will have a freezing point below the required refrigerant temperature and a boiling temperature high enough so that water may be separated by distillation at a point considerably below the boiling point of the anti-freeze material itself. As moisture is condensed out of the air, the solution becomes diluted, the level in the spray pan rises, and this in turn operates a float switch which turns on a pump that feeds solution to a concentrator with a controlled boiling temperature. As long as dilute solution is fed to the concentrator, the boiling point of this solution will be below the temperature at which the concentrator is set to operate. Water vapor will, therefore, be liberated and after passing through a filtering system, it will be wasted to sewer while the strong liquor is returned to the spray pan. When at last the solution reaches equilibrium at the desired concentration, boiling action will cease and will not be resumed until the solution again reaches a point where the controls cut in. Thus an automatic operation is maintained. This will take care of a constant moisture gain or a periodic surge and the length of time the concentrator will operate will be governed entirely by the amount of moisture picked up in the system.

Sources of Moisture

All of the moisture gain in the room is primarily a product of dehumidification of "make up" air and dehumidification of the product. The moisture loss in the product is as a rule undesirable and while it cannot be entirely eliminated, it can be controlled. The higher the refrigerant temperature at which the cooling unit is operated, the less the temperature difference between coil surface and room air, the higher the dewpoint, the lesser amount of moisture extracted from the air, and as the product is cooled by contact with the air the less dehumidification of the product. Any of the Spray Systems or Non-Frosting Systems permit the higher refrigerant temperature.

Moisture gain in sub-zero rooms is extremely objectionable resulting as it does in frost accumulation which must eventually be disposed of. For the greater part it is provided by infiltration of air into the room as "make up" for air lost through opening of doors, conveyors, or other causes. This "make up" air will enter the room at relatively high temperature and moisture content and all surplus moisture will either be deposited on walls, ceilings, product or find its way to the cooling surface and eventually to the spray pan. In the case of the brine system this will cause waste of brine and require its more frequent conditioning. In the case of the No-Frost System, the amount of operation required of the concentrator will be directly proportional to the amount of moisture it must remove from the spray solution.

If air used for "make up" can be dehumidified before it is introduced into the room, a very worthwhile operating gain can be made. As an example, let us take the room in question which is held at —10 F. and possibly 95 percent relative humidity. The air would contain under these conditions approximately 3.3 grains of moisture per pound. If "make up" air were drawn from outside, as it would be, and entered at +90 F. with 50 per cent relative humidity, it would contain approximately 109 grains per pound. In other words, about 106 grains moisture per pound must be removed to bring the air to the condition of the air in the room. If this air were cooled to 33 F. saturated, as it could be in a non-frosting coil without sprays, it would contain about 27 grains of moisture per pound. It will be observed that about two-thirds of the moisture could be taken out in the form of condensate which would be run off to the sewer without the necessity of sprays or any other defrosting means.

This can be accomplished by the use of a Two-Stage Pre-Cooler. This cooler has two separate coils with separate controls. The first stage is operated above freezing so that the air is cooled to the lowest possible point to which it can be cooled without freezing on the coils. In this stage the air entering with say 109 grains per pound can be cooled until it contains only 27 grains per pound, provision being made to collect the moisture from the surface of the coil and run it off to the sewer. As previously stated, therefore, two-thirds of the moisture has disappeared of its own volition. The second stage is operated at the temperature of the room and is sprayed with the anti-

freeze solution. The amount of moisture removed in the second stage is not a serious problem. It is only about 1/3 of the total amount and does not unduly load the concentrator. This whole unit need only be large enough to handle a little more than the amount of air required for "make up" in the room. It takes its air from the outside, discharges it into the room constantly, by means of a fan. This puts the room under a slight pressure and any leakage that may take place through doors, conveyor openings or other means will be in the form of air leaving the room. In this way infiltration is prevented, and all the air brought into the room is kept under control as far as temperature and moisture content is concerned. When the room is closed up tight, the fan will be operating but no air will actually be passing in because when no air comes out no air goes in. If, however, a door is opened, or a conveyor started, pressure on the room will immediately push air out of the room and the Pre-Cooler will provide conditioned air to replace it. It should be noted too, that it is possible with this unit to provide filters so that all of the air coming into the room is not only controlled as to temperature and humidity, but is cleaned of dust and air borne substances which might be objectionable.

Basis of Choice

After a proper evaluation of the problem and determining exactly what has to be done, a choice may be made between the various types of systems described. As before stated, any of these systems will maintain temperature. The choice really narrows down to two factors. The first, the type of equipment which will meet all the requirements of temperature, humidity and air movement, and second, the installation and probable maintenance cost of such equipment compared to what it will produce.

Of the various systems described, the Gravity Flow Type System is undoubtedly the most crude, the most inefficient, and least desirable, and the automatic No-Frost System with the "make up" air two-stage Pre-Cooler the most efficient and desirable. The first cost of this system would naturally be higher than that of the other systems. Its operation and maintenance should be lower and the quantity and quality of the product better.

Where Ducts Are Required

Blower actuated refrigerating units may be used in cold storage rooms without ducts under certain conditions. The blow should not be over 60 feet. The ceiling should be flat and free of beams or other obstructions. The product should so be stacked that the air can pass freely over the top of it and so spaced that the air can drop down between and through the stacks and reach every package in the room. If this is a processing room where people are working, too great air motion is not desirable, and people should not be expected to work close to the units where they would get any considerable amount of air blast. If more than one unit is used in the room, they should be so placed that air circulation will follow a definite pattern.

In rooms where such conditions do not prevail, ducts with continuous distributing slots or difuser outlets properly spaced should be used. The ducts should be provided with proper dampers or splitters so that the various branches may be controlled and an even velocity provided at all outlets, regardless of distance from the unit. In the continuous slot type duct, the duct is placed close to the ceiling and the continuous slot cut at full length. In some cases, slides are provided so that the dicharge area may be regulated to take care of the drop in velocity in the ducts and provide an even flow of air in all parts of the room. These ducts seem to be very successful.

Quite as important as the distribution of the air is the fact that the air must get back to the unit. As a matter of fact, the cooling of the product is accomplished in the return of the air from the duct or defuser from point of discharge on its way back to the unit. The product should, therefore, be so arranged that the air can pass through it and the intake of the unit should be kept free of obstruction so that a consistent and regular flow will be promoted. Too many operators pay too little attention to this important requirement. They are so anxious to get the greatest amount of product into the room that they pay little attention to the fact that the air must circulate to cool it. The result is that their product either spends more time in the room than it should or is not properly cooled. Where a room is used for processing and where workers must work in the room for any appreciable length of time, great care should be taken in the arrangement of ducts, defusers, or other air stream control so that conditions injurious to their health will not be maintained.

NAPRE 1949 Convention

Purdue University, Lafayette, Ind.

November 8, 9, 10, 11

THE 40th annual convention of the NAPRE will be held at Purdue University on November 8-11. Through arrangements made by Professor H. G. Venemann, chairman of the National Educational Committee and the Extension Department of the University, the association will begin its fortieth year with a new type of meeting. The invitation which he presented for this meeting to the convention last year was received with enthusiasm and many attendants declared "That is one I will not miss."

Meanwhile the plans have been developing to take full advantage of the engineering and educational facilities of the university for those who attend the convention. On the staff of the university are many experts in fields in which the refrigerating engineer needs and can use specialized knowledge. These include electricity, welding, machine shop practice, instrumentation and hydraulics. In addition there are specialists on the application side such as in air conditioning and dairy plant operation. From them the attendants at the 1949 convention will gain a wealth of information they want to assist them to improve plant methods and operations.

The subjects will be presented in the form of Lecture-Demonstrations to the greatest extent possible. For illustration of the lectures, actual methods and equipment will be demonstrated rather than shown wholly by slides. Inquiries received from members about the convention indicate that many are already making plans to attend and benefit from the fine program it will present.

The facilities at Purdue provide excellent exhibit space. Booths are set up around the walls of the large meeting hall in which convention sessions are held. There, between sessions the manufacturers and suppliers of the industry can show their products and the refrigerating engineers can discuss their operating problems with factory experts.

The meeting hall is in the Purdue Union Building the well appointed center of university activity. A large number of guest rooms are in the Union Building and it has two good restaurants. Additional space will be offered to convention attendants in Lafayette hotels.

Complete information and reservation blanks will be sent to all members later in the summer. Now, set aside the second week in November to come to Purdue University for the 40th Annual Meeting.

N.A.P.R.E. Department

Member Activities

New Orleans

By Frank Gillio

THE guest speakers at our meeting of Wednesday, April 27, were Messrs. P. Schmertz, sales engineer and L. Mc Cubbin, application engineer of the Equitable Equipment Co. of this city. Their subject covered governors for steam turbines which included the shaft type constant speed governor used on mechanical drive turbines, constant speed oil relay type used on turbo-generators and the variable speed type as used on turbines for driving centrifugal refrigerant compressors. The speakers also discussed overspeed governors which are required on turbines in addition to the usual speed governors. Slides relating to this subject were shown. A rising vote of thanks was given at the conclusion of the talk.

The next meeting of the chapter was held on Wednesday, May 11, in Room A of the St. Charles Hotel. The speaker was Cecil Shilstone of the Shilstone Testing Laboratories who delivered a very instructive, enlightening and educational talk on water treatment.

The speaker had on display a C.E.P.I. electro magnetic apparatus, which, when hooked up into any feed water line to boiler, water line to condensers or water line in homes will dissolve and eliminate calcium incrustation and scale. He stated that this apparatus is revolutionary and is doing the work as claimed by the inventor. No chemical of any type is used. Every member present was vitally interested during the entire discussion, questions being asked and ably answered. A rising vote of thanks was given to the speaker at the conclusion of his talk.

A motion picture, courtesy of the Chicago & Southern Air Lines showing the wonder spots of the Caribbean, including Havana, Jamaica and Caracas was shown and was appreciated by the attendants, especially the scene showing the beautiful senorita doing the rhumba.

The meeting of Wednesday, May 25, was a business and educational one. The members were requested to put forth every effort and bring in the "ads" for the National Data Book before the deadline. In our next report we will include the names of the members who have worked very hard to procure these ads and we believe that they should be given full recognition for their efforts and time.

Estes W. Mc Kirsney, district manager of the Square D Company was the speaker of the evening. He imparted to the attendants, valuable and instructive information on thermal overload protection for motors, motor starters and trouble shooting. The latest types of motor starters, circuit breakers, thermal overload relays and various types of switches were on display for the inspection of those present. The members are always interested in this type of program and propounded all types of questions to the speaker who ably answered them. At the conclusion Mr. Mc Kirsney was given a rising vote of thanks. P. H. Graham was accepted as a member and was given the oath of membership by Past President O'Connor.

The National Association of Practical Refrigerating Engineers offers opportunities to those who wish to further their knowledge in the refrigerating field. For full information on membership, write to the Secretary, 435 N. Waller Ave., Chicago 44, Ill.

Colton

By H. O. Bonter

California Chapter No. 5 held its regular meeting at the usual place, the Santa Fe Ice Plant lunch room, San Bernardino. After the regular business was taken care of the meeting was turned over to the guest speaker of the evening, Don Hess of the Standard Oil Co., San Bernardino. Mr. Hess gave a talk on the production of oil in Arabia. He also presented a sound-color motion picture titled "New Frontier." It showed the progress of the Standard Oil Co., in oil development in Arabia. In producing the oil it is aiding the people of that country to be more productive by educating them and aiding them in growing farm products by irrigating and cultivating that has never been done before by the people of that part of the country. The Standard Oil Co. is also teaching the people there to do mechanical, clerical, office work and many other kinds of work they never had the opportunity to learn before. They have built irrigating canals, oil pipe lines and many fine homes with fine lawns and flowers and due to the extreme heat the homes are air conditioned. The temperature reaches 130 and 140 degrees. The Standard Oil Co. is also building large refineries to produce many hundreds of by-products.

E. H. Carlson, educational instructor, gave his class lecture on the compression cycle. The members finished the evening with the usual lunch.

Rio Grande Valley

By Armin Doneis

At the opening meeting of our second year of instruction, Instructor John Muller briefly reviewed some definitions of terms commonly used in refrigerating work, and in compliance with a popular demand staged a second showing of the visual education film entitled "The Principles of Refrigeration" produced by the Graphic Films Corp. The showing of this film with subsequent interpretation, clarification and explanation of various points made the refrigeration cycle more vivid and understood by many of the members who seemed to experience difficulty in visualizing for themselves the changes that occur in the four distinct stages of the cycle.

As a guest speaker, Mr. Hayes of the Soft Water Service Co. of McAllen, was introduced by Russell M. Sawyer. Mr. Hayes described some of the problems involved in operating water demineralizers and discussed various problems and chemicals involved in water-conditioning. He discussed various ways by which savings can be effected through preventing overflow of the brine tank or drawing in too great a quantity of brine during the operator's unavoidable attention to other matters while regenerating the zeolite softeners.

By the use of a simple bell circuit arranged at the brine tank with two electrical contacts at the upper safe brine level a signal can be given audibly when the brine tank is safely full, calling for shutting off of the refill valve.

By installing a small pipe ahead of the brine valve and letting the open end dip into the brine tank to the level at which the prescribed quantity of brine will have been drawn into the softener during regeneration, the withdrawal of brine will cease automatically when the level of brine in the brine tank has dropped to this level, by uncovering the open end of the pipe and allowing the injector to suck in air. This simple arrangement was recommended as an effective means to prevent waste of salt at times of peak activity of the operator when he is not free to give all his attention to regeneration, and the speaker claimed that in his own plant in a period of several years a tremendous saving was effected.

The speaker also described the use of hexametaphosphate in water systems for the purpose of holding dissolved solids in solution in higher concentrations with a view to eliminating or reducing the amount of scale and precipitation.

Two new members, J. A. Lucius, Jr. and Milton Reagan were welcomed into the chapter at this meeting.

Professor W. R. Woolrich Sr., dean of the College of Engineering, University of Texas was guest speaker at the dinner-meeting of Rio Grande Valley Chapter, June 1, in Reese-Wilmond Hotel, Harlingen.

Dean Woolrich was introduced by his son, W. R. Woolrich Jr., who is our Chapter president. Prof. Woolrich reported on the progress of refrigeration in Britain and on the Continent. During a year's leave of absence from his post in Texas he was connected with the State Department as Chief of the Science Section of the American Embassy in London. During his stay abroad Dean Woolrich attended numerous conferences such as the Nordic Refrigerated Foods Conference in Oslo, Norway, in which noted engineers from seven or more nations participated.

The speaker described briefly the hardships being borne by the British under their program of austerity and expressed admiration for the spirit of the people. He mentioned some of the language difficulties encountered when he used words such as corn, vest, and napkin which have quite different meanings to the Englishman from the usage he was accustomed to in America. He explained also the differences which cropped up owing to the use of the British long-ton of 2,240 lbs. instead of the American short-ton, and to the fact that the British base their refrigeration calculations on 142 Btu. instead of the 144, standard for

the latent heat of a pound of ice in this country. All this leads to crediting a ton of ice with 318,080 Btu. in Britain; all comparisons had to be equated with these differences constantly in mind.

Due to the cool climate of the British Isles the speaker found little demand for refrigeration there and he expressed his surprise over the fact that during his stay he saw just two ice-delivery wagons in England. Most iceplants are located along the coast where almost their entire output is consumed in the fishing industry. He remarked that need for air conditioning is practically nonexistent in England; for example the English newspapers heralded a "heat-wave" of 78 F. in large headlines. Refrigerators and iceboxes are not used there because much of Britain's food is either pickled, smoked or cured, and householders keep more perishable foods in pantries with northern exposure. Due to coal shortage he found heatpumps gaining in favor in Britain as also in Iceland. The speaker expressed admiration at the soundness of British engineering practice and stated that they are leaders in the building of refrigerating machinery for marine purposes. He also lavished praise on the extent and quality of their basic scientific research.

In Iceland Dean Woolrich found extensive and intensive application of refrigeration for quick-freezing of perishable products in large volume during the relatively short growing season; this was true also in Norway, Sweden, Denmark and Finland. On the continent Prof. Woolrich explained the hindrance to general application of refrigeration in the food industries which arises from the different track-gauges in the various countries. Refrigerator cars are commonly government-owned and cannot cross borders for this reason and because of their varied track-gauges. The fact that their cargoes must be transferred at frontiers greatly discourages international shipment of perishable goods. There is now, however, an effort under way to build and complete 5,000 international refrigerator cars by 1952, which will be suitable for use on the various systems to encourage international shipments and round-trip loads, which should greatly ease the conditions now hampering European interstate commerce and applied refrigeration.

Dean Woolrich's presentation of his subject was accomplished in a clear and humorous manner and our members thoroughly enjoyed both the technical report and his lighter comments, as was evidenced by their numerous questions and reluctance to go home at the close of the meeting.

San Francisco

By Andy Hope

At the first meeting of the month, Lesson 9 was distributed to all who attended the preliminary refrigeration class. After due consideration of the subject a vote was taken on the summer schedule and a majority were in favor of continuing meetings during the summer without any vacation period.

The principal speaker of the evening was Harry Holbrook of the Union Ice Co. Over a period of many years Mr. Holbrook has established a reputation for presenting fine discussions of engineering subjects. On this occasion he talked on Refrigerant Evaporators, a subject in which he has long been interested and has made broad investigations. His treatment of this subject gave all of us much useful information on the fundamentals and the refinements of such systems.

Educational Committee Chairman Walter W. Sandholt certainly presented an outstanding program on June 8 at the San Francisco General Electric Service Shops where we were the guests of Assistant Superintendent Ralph Y. Meyers. With a crew of ten guides and twelve workers the entire operations of the shop that serves all of Northern California was shown and explained to us in detail.

In the Machine Shop Walter Morgan explained a demonstration of shaft metal spraying and J. J. Cardoza presented a demonstration of dynamic balancing on machines that can handle up to 19,000 lb. shafts and balance them at their critical speeds (around 400 to 500 rpm).

In the Electrical Shop Barney Smith showed us how armatures and fields are rewound. Several men were working on a 12,500 generator field from the Midway Steam Plant (near Bakersfield) that had seen 28 years of service before the insulation deteriorated enough to require rewinding. Also in the shop were several traction motors from the Alco-G.E. Diesel locomotives of the Southern Pacific Streamliners that were in for overhaul after 300,000 miles of service.

Bill Stegeman, Production Supervisor, explained that one of the things to be done was the repacking of the bearings with grease and the sealing of the openings so they wouldn't be regreased again for about 250,000 miles. Mr. Smith then showed us how coils are wound, formed and wrapped and explained the various types of insulated wires and wrappings that are used. A hang-over from the War Period concerns the silver windings that were installed in generators in this area during the period when copper was scarce. These windings are now being replaced with copper so that Uncle Sam can get his silver back, the operation involving about a million dollars for this area alone.

In the Fractional Horse-Power Shop Ray Colla had several assistants demonstrate the disassembling, rewinding and assembling of these smaller motors—from one twentieth to about one hp (the other parts of the shop take care of motors up to about 1000 hp). The smaller motors are usually handled on an exchange basis.

At the conclusion of the tour we returned to the main office where Norman Tropf presided over the tables heavily laden with coffee, milk, donuts and ice cream while Ralph Meyers answered the numerous questions asked by our group who certainly spent an enjoyable and instructive evening as the guests of General Electric.

Pittsburgh

By Louis Mantz

The regular meeting of Pittsburgh Chapter was held in Parlor H of the Fort Pitt Hotel on May 18. The program of the evening was presented by Kenneth Day of the Westinghouse Electric Corp. and consisted of two films. The first one showed how proper lubrication of equipment aids to insure reliable operation and to reduce maintenance expense. The second film entitled "Summer Storms" showed how central station power plants must be prepared at all times to meet storm conditions. When the sky fills with clouds and the day grows dark there is a great upward surge in the demand for electricity. Power plants must be ready at all times to meet this demand, although they have no way of knowing just when it will occur. A rising vote of thanks was extended to Mr. Day for presenting the pictures.

The general business of the chapter was discussed in the meeting that followed. The Manual of Duties for National Officers was read and placed on file. A committee was appointed to investigate the purchase of a motion picture machine and they will report back at a later meeting. The motion was carried to give a prize to any member bringing in 5 applications from new members. Several prizes were discussed and winners will be given their choice.

It was decided to discontinue the chapter meetings during July and August. The secretary will notify the members of plant visits to be arranged during the period. Chapter members were pleased to hear the report that Frank Trost is recovering from his operation and is expected to return to work shortly.

Seattle

By J. D. Henion

The meeting held in the Board Room of the Y.M.C.A. was preceded by a dinner. After introduction of those present Bob Rittenburg introduced Mr. Christenson and Mr. Rice of the Materials Handling Equipment Co. They presented a very fine motion picture dealing with the use of the Towmotor for rapid methods of materials handling and warehousing. In the business meeting that followed an invitation was received from William Allen, chief engineer of Frye & Co., inviting the members and their guests to hold a plant inspection of their operations on June 1. The members voted to accept the invitation and arrangements were made to meet at the plant at 7:00 p.m. on that date.

It was suggested by Mr. Bertus that the educational forum be set up again in charge of O. F. Gellert. Much favorable discussion was presented and the matter was scheduled for future action after a conference with Mr. Gellert.

The chapter concurred in the suggestion of President Giel that the member securing the most new members by the time of the next meeting on September 8 would receive a paid membership from the chapter funds as a prize. The meetings of the chapter will be adjourned from the time of the plant visit until the meeting of September 8.

N.A.P.R.E. Department

Chicago

By E. B. Jones

The spring program of Chicago Chapter was concluded on May 17 with Ladies Night. The members, guests and their wives gathered in the lounge at the Chicago Engineers Club where a number of group photos were taken by Leslie Clifford and Leroy Hinkey. Then they proceeded to the dining room where they enjoyed an excellent dinner. Retiring President Charles Reid welcomed the members, wives and guests to the affair and introduced the new officers headed by Eugene Rytlewski, president. Mr. Rytlewski promised a diligent administration with the cooperation of his associates and thanked the chapter for its expression of confidence.

An illuminated testimonial was presented to Mr. Reid by Emerson Brandt in behalf of the chapter. He paid tribute to the work accomplished by the retiring president during the year, and said he hoped the testimonial would be a pleasant reminder of the personal associations in the chapter. Mr. Reid responded with sincere thanks to the group and acknowledged the cooperation he had received from his co-workers and the chapter as a whole.

An interesting sound color movie entitled "Trees to Tribunes" was presented through the courtesy of the Chicago Tribune. It depicted the vast lumbering operations carried on in the forests of Canada to secure the logs for making paper pulp. Whole towns had been established to provide the bases for these operations and the logging work goes on throughout the year. The logs are accumulated in and along streams in the territory and the great log drives to mills and shipping points in the spring were a spectacular feature of the film. The operations were traced through the pulp and paper mill to the printing plant where the methods of publishing and printing the paper were shown.

St. Louis

By W. J. Wright

The officers elected to serve the chapter during the coming year are:

President K. M. Holaday,
Vice President, Wm. J. Wright
Secretary, Eugene G. Bishop
Treasurer, Eugene Kessler
Sergeant-at-Arms, Bryan Elliott

The ballots were counted at the final meeting of the season held at the Little Bevo Restaurant. The members of the chapter gathered there early for a social hour and then enjoyed an excellent dinner. An educational film entitled "The Mineral Industry in Illinois" was presented and proved to be highly interesting and instructive. It was followed by a film of an entertaining nature. A good number of attendance prizes were distributed; these had been donated by members and friends of the chapter.

Memphis

By Charles Conley

A special event of the chapter season was the plant inspection trip through Layne-Central Company's new modern offices, shops and warehouses at 2075 Chelsea Ave. President J. I. Seay of the Layne-Central Co., was a perfect host to their friends, the members of the chapter and guests. At this open house and dutch lunch party every one renewed old acquaintance and inspected the fine facilities of the company. Assisting the host were his very efficient personnel, Tom Ragsdale, Tom Y, Owens and R. M. King. O. A. Fabrin, chief design engineer for Layne-Bowler Co. was toastmaster and principal speaker of the evening.

Set up for inspection on the grounds were portable rigs for repairing deep wells and pumps. Also shown was equipment for testing the capacity and output of wells and a demonstration was given of the operating of cementing deep well casings from top to bottom of the well. The evening was completed with the serving of a fine lunch to all those present.

The chapter has always enjoyed the plant visits and parties arranged for them by the Layne-Central Co. This one was no exception. Everyone had an interesting and enjoyable evening.

At the following meeting a short business session was held. The annual water-melon party and summer roundup was scheduled for Wednesday, August 17. Doug. Smith, chairman of the affair, promised that the melons would be up to the usual high standard and suggested that everyone set this evening aside to be in attendance. William E. Thweatt of the Simpson Engineering Co., was elected to membership. The evening was concluded with a round-table discussion including the questions and answers published in the June issue of Ice and Refrigeration.

Los Angeles

By Fred A. Herr

More than 150 members gathered on May 18 at the plant of Refrigeration Engineering, Inc., to inspect their manufacturing facilities and see hod Recold refrigeration equipment is made. Careful preparations had been made to take care of the large group in accordance with a plan developed by Dan Wile, chief engineer. Although the plant is not operating a night shift at present, a skeleton crew of employees was maintained to carry on the most interesting operations in each department.

Guides conducted the visitors through the plant in groups of not more than 15, and explained the manufacturing processes, as well as answering the many questions developed during the course of the inspection. As each group of visitors completed the tour of the plant they were given an opportunity to inspect actual working models of the different types of equipment they had seen in manufacture. Then a lunch and refreshments were served and the group enjoyed an interval of visiting and information discussion.

The climax of the inspection trip was a smoke bomb demonstration of air circulation through a Recold ceiling type water defrost coil. This large coil which operates with 15 hp. motors to drive the fans was suspended high in the ceiling of the plant. At the floor level below the coil the smoke powder was ignited and the smoke was quickly drawn up through the coil and discharged through its outlets. Then at high velocity the smoke was distributed far across the room to set up a general pattern of circulation.

The regular refrigeration class with Elmer Johnson as leader started the meeting of June 1. On hand for inspection by the members was the television set which many of them looked over with a certain amount of anticipation.

The special speaker of the evening was Frank Elliott of The Union Ice Co., who drew on his long experience with refrigeration plants and problems to conduct a session of questions and answers on engineering subjects.

N.A.P.R.E. Question Box

NOTE: H. G. Venemann, Chairman of the Educational Committee, has agreed to answer through this column all questions asked by the members of the N.A.P.R.E. Please send your questions to him care of Purdue University, West Lafayette, Ind.

Oil in Refrigerating Coils

Question No. 814: Quite a number of cold storage plants are troubled with oil collecting in their evaporator coils. It not only reduces coil efficiency but also affects the operation of equipment such as float and thermal valves. Sometimes this oil is difficult to remove. Would kerosene be practical as a solvent to feed in while the system is in operation and thin the oil for easier removal?—W.N.T.

Answer: I seriously question the advisability of introducing kerosene into a volatile system for any purpose. In the first place I would be reluctant to introduce such hydrocarbon compound for fear that its gases would eventually be trapped in the oil separator and cause an explosion at the high temperatures and pressures prevalent there. In the second place it is doubtful if the kerosene would aid in removing the oil. To secure an expert opinion on this matter I sent the question to the research division of the Texas Company at New York and received the following reply from their Assistant Manager, F. E. Rosensteihl:

"We wish to advise that we have had no experience with the use of kerosene for the purpose which is involved. It would seem to us that the practice might be impractical and we do not believe that kerosene would necessarily be effective for the purposes outlined!—H. G. Venemann.

Booster Capacity

Question No. 815: How would you calculate the displacement of a booster compressor that would have a refrigerating capacity of 75 tons when operated at each of the three suction pressures:

0 lb. gauge 5 in. vacuum 10. in. vacuum

The booster discharge pressure would be maintained at 25 psi. while the second stage discharge would be 175 psi.—W.N.T.

ANSWER: To calculate the displacement required for a booster compressor of 75 tons capacity when operating at three different suction pressures and at a fixed discharge pressure I would proceed as follows:

First compute its theoretical displacement and then apply a reasonable value of volumetric efficiencies. The theoretical displacement in cubic feet per minute at each of the suction pressures may be computed by using the following formula:

$$\text{c.f.m.} = \frac{75 \times 200 \times v3}{h3 - h1}$$

h3 = enthaphy of ammonia leaving evaporator and entering compressor

h1 = enthalphy of ammonia liquid before expansion valve.

v3 = specific volume of vapor entering compressor.

In the interest of economical operation and lower piston displacement the liquid ammonia should be pre-cooled from 93 F after it leaves the condenser to about 20 F, by direct expansion at the 25 psi pressure. When this is done h1 will be 64.7 Btu. per lb.

In order to avoid interpolating the ammonia tables, I suggest that the following absolute pressures be used instead of the gauge pressures assumed in the problem, vis. 15, 12 and 10 psia. The gas entering the compressor will be slightly superheated in each case having the following temperatures 20F, 30F and 40F.

With these assumptions and by use of the formula given above the following results are obtained.

THEORETICAL DISPLACEMENT, C.F.M.

Suction psia	h_3	h_1 at 20F	h_3-h_1	v_3	CFM
15	606.4	64.7	541.7	18.01	499
12	602.3	64.7	537.6	22.07	615
10	597.8	64.7	533.1	25.9	729

The volumetric efficiencies of compressors depend upon the pressure ratios, the percentage of clearance, the gas velocities and friction through ports and valves, the lubrication, etc.

Motz in Principles of Refrigeration shows by a series of curves in Fig. 29 the volumetric efficiencies of several types of compressors at pressure ratios from 1 to 12. Using his values for vertical single acting (VSA) compressors and for horizontal double acting (HDA) compressors at the three pressure ratios given we obtain the following results.

PROBABLE ACTUAL DISPLACEMENT, C.F.M.

Suction	Pressure	Theoretical	Volumetric Eff.		Actual	CFM
psia	ratio	C.F.M.	VSA	HDA	VSA	HDA
15	2.67	499	.92	.86	543	581
12	3.33	615	.91	.83	677	640
10	4.00	729	.90	.81	810	900

Note: If the liquid is not precooled from 93F to 20F before throttling the displacement in each case will be increased about 18 percent, because the refrigerating effect per pound of ammonia will be reduced from 538 Btu to 455.5 Btu.—H.G.V.

Wet Gas Suction

Question No. 816: We are troubled with liquid coming back to our compressors under certain conditions. Our plant, equipped with two 7½ x 7½ compressors, contains a 5-ton ice tank, two freezer and five cooler storage rooms. All of the rooms have solenoid valves in the liquid lines. The freezer rooms have thermal expansion valves and we have no trouble with them. The cooler rooms have flooded float control evaporators. There are solenoid valves in the suction lines from all rooms except the meat cooler and the ice cream storage. The latter as mentioned, gives no trouble. The coolers are operated at 35, 37, 43 and 48 F.—all on 5 degree range.

Our trouble is that when the solenoid valves open on any one of these evaporators we get a wet gas to the compressor for a few minutes. We have renewed the float valve pins and seats but the liquid refrigerant continues to come over in the suction as described. What can we do to prevent this liquid return to the compressors?—H.V.S.

ANSWER: The trouble you mention with the suction solenoid valves is characteristic of such valves and there is little you can do about it except to install a good sized liquid trap to catch the over flow or install back pressure valves in the suction lines in lieu of the solenoid stop valves.

When the solenoid valve in the suction line shuts a pressure is built up in the coil. When it opens there is sufficient pressure differential to cause a surging or priming action thus blowing liquid over into the line. A back pressure valve in the suction line will relieve that pressure in the coil and permit the pressure to build up in the line when the compressor is shut down, thus preventing this surging toward the compressor.—H.G.V.

New Questions

Defrosting Zero Freezers

Question No. 817: I have a problem in defrosting for zero degree low temperature rooms. I have hot gas line from an 8 x 8 ammonia compressor which runs through a cooler and then feeds to four different rooms. My trouble is, at times it works all right and then at times it slugs back to the machine very fast and has to be watched very closely. I do not like to defrost with the compressor and would like to know if it would be advisable to have a suction trap with an ammonia pump returning liquid to the receiver. I have not seen a system of this type and those I have asked express a difference of opinion. Could you advise what is the best method? At present we have to defrost with a hand scraper instead of using the compressor.—F.P.

Stuck Freezer Doors

Question No. 818: What are the best methods of reducing the accumulation of frost and ice around the door gaskets of freezer doors?—J.R.H.

Liquid Refrigerant Pump

Question No. 819: In our quick-freezing plant the liquid ammonia pump is noisy and appears to wear too rapidly. This is a gear-type pump operating on liquid around —40F. Can you suggest any remedy to improve the pump operation?—S.R.E.

40th N.A.P.R.E. Convention

Purdue University, Lafayette, Ind.

November 8, 9, 10, 11, 1949

Make your plans now to attend this meeting

ENGINE ROOM POINTERS –

Useless Friction Costs As Much As Useful Friction

CONSIDERABLE friction in most plants can be eliminated. Friction costs money. The useless friction costs just as much per horse power or kilowatt as does the useful friction. In fact, all of the power that is developed in most plants, and which the engine or motor gives up, is lost in friction somewhere or other. Power is seldom stored anywhere; therefore it is all lost. This is true of all power, everywhere.

Let us suppose, for instance, that in your plant 50 per cent of the friction is useful friction, while the remaining 50 per cent is useless. If you could eliminate the useless friction you would then have 100 per cent useful friction. It should be the aim of the plant operator, then, to eliminate as much useless friction as possible add it to the useful side of the ledger, and thereby increase the capacity of his plant, if need be, without installing new equipment.

It may not pay to install ball bearings all over your plant, in place of present bearings, because ball bearings are rather expensive in first cost. While ball bearings do consume but little power, will that saving pay for the new bearings quickly enough? Ball bearings should not be used in places where the saving in power would amount to less than the interest on the first cost, plus the cost of depreciation. All of these figures and factors must be considered before ball bearings are installed in place of less expensive types. All reliable manufacturers agree that this is correct.

Main bearings are most important because they usually handle all of the power. Thus if the efficiency of a main bearing is only 95% it will absorb 5% of the power of the engine or motor. But, if the efficiency of 100 small bearings distributed all over the plant is 95%, they will absorb no more power than will the single main bearing, whereas it is quite possible that it would pay well to equip the main journal with ball or roller bearings. Do not install new transmission equipment, though, unless you are certain that you cannot sufficiently improve your old transmissions, without it. Perhaps you can improve the old equipment. Have you tried?

A good way in which to test the friction load of an engine or motor—a method that does not involve the use of expensive testing machinery or instruments—a method that is so simple it should be used very often by every operator of machinery—is as follows:—

By means of your watch note the time required for your machinery to come to a dead stop after the power is shut off. That is all there is to it. Let me explain why this test is so good: Consider the flywheel of a 50 h.p. engine which runs at the normal rate of 250 r.p.m. That flywheel has a definite weight and contains a definite mount of stored energy while it is running. No matter what year, month, week, day, hour, minute, or second, the flywheel is running, it contains exactly so much stored energy while running at the normal speed of 250 r.p.m. Therefore when you shut off the power the flywheel will continue to run for a while. Then longer it runs the less the friction in your machinery. The problem therefore is simply that of making the stopping time of your machinery as great as possible by eliminating friction wherever it can be eliminated.—W.F.S.

How to Use a "Positioner" When Welding Pipe Joints

WELDING in modern manufacturing plants has brought about the creation of a new and valuable machine called the "Positioner" by some and the Manipulator" by others. It is a sort of gigantic lathe face plate, adjustable to any angle and to which face plate the work is fastened whether it be a portion of a tank, airplane, gun, ship, or what not. By means of this positioner the work is rotated around to any position most convenient to the welder. It is a time energy and back saver.

In the welding of pipe joints the principles of the Positioner can be advantageously copied as indicated in the accompanying sketch. The thing to do is to turn or "Position" as much of the piping as possible when welding so that the work can be performed conveniently from above. Don't "get under" at every joint. Thus let us say that you are welding from the right and toward the left. The piece of pipe at the extreme right is rigid and cannot be turned. Do not weld the joint marked "Last". Wait a while. First weld 1, then 2, then 3, 4, 5, etc., and "position" the work by turning the pipe. When you have handled as many joints in this manner as practicable, then weld the joint marked "Last".

Work of this kind is sometimes performed on a concrete base, as indicated, particularly in connection with central station heating jobs. Where pipe runs are long and straight nearly all of the joints can be positioned in this manner. However, even where there is no concrete base and where grades are variable it is well worth while to bear this "Positioning Method" in mind. It is a great time, energy, back and money saver.—W.S.F.

The Water Meter Disc Was Ruined

HERE is an occurrence that may interest readers who wonder what happens when one tries to run hot water through a water meter that was built for cold water metering.

We learned our lesson "accidentally." A water heater that was gas heated was not being properly watched and it caused hot water to back up toward the meter when hot water was not being used by the consumer. The water temperature was not automatically regulated. When the hot water finally reached the water meter itself things began to happen. The two unions started to leak and steam blew out of them. The water, you see, was truly "hot."

The leaking and blowing steam finally attracted a caretaker who decided that something was wrong and he shut off the gas not knowing what else to do. After that it was found that the meter wouldn't "work" any more. The disc was sprung.

A new disc plus re-gasketing of the unions took care of the situation, but, as already stated, we learned what will "happen" to a cold water meter when it gets hot.

Frozen Foods
Reg. U. S. Patent Office
COVERING EVERY PHASE OF THE QUICK FREEZING OF PERISHABLE FOODS—PREPARATION, PACKAGING, FREEZING, STORAGE, DISTRIBUTION, DESIGN, CONSTRUCTION, EQUIPMENT, OPERATION OF LOCKER PLANTS.

How To Produce and Maintain Good Quality in Frozen Egg Products

THE processing, storing and defrosting of frozen eggs have been investigated at Ohio State University to determine methods which yield the product of highest quality. Financed by The Refrigeration Research Foundation, this three-year study was carried on by Alden R. Winter and Carolyn Wrinkle of the University staff.

Their report published recently[1] gives much information of direct use value to egg breakers, processors, storers and users. The report in three parts describes how: (1) frozen egg quality depends on clean eggs, clean equipment, quick cooling, (2) fast freezing at low temperatures protects frozen egg quality, (3) proper defrosting methods keep bacterial counts low in frozen egg products.

Breaking, Packing, Chilling

The first section, related to egg supplies and breaking plant practices, is summarized as follows:

1. Clean eggs with sound shells and good interior quality are essential to the production of liquid egg products with a low bacterial content.

2. Pasteurization of liquid whole egg or yolk at 140-142 F. for two minutes, or of egg white at 134-135 F. for the same length of time, will kill more than 99 per cent of the bacteria present in the product.

3. Liquid egg should be placed in the freezer (—10 F. or below) as soon after preparation as possible, because bacteria immediately may begin to multiply rapidly, especially if the egg is held above 60 F.

4. Breaking plant equipment should be cleaned at least four times a day. All dead-end passages, exposed gaskets and other sources of bacterial contamination should be eliminated in order to prevent bacterial multiplication and high count products.

Experiments show that cracked, dirty, old and addled eggs are more likely to contain bacteria and to contain them in greater numbers than fresh, normal clean eggs.

Candling will detect many, but not all, eggs of low quality and high bacterial content. Removing eggs which candling indicates are undesirable will reduce contamination of breaking equipment and the liquid egg.

When the eggs are broken, bacteria fall from the shell into the breaking cup, stick to the contents along the edges, to the breaking knife, and to the breaker's hands. Moist eggs or wet hands result in greater contamination. The more eggs broken without washing the breaking knife, cup, tray and hands, the greater the contamination of the liquid egg. Consequently, the cleaner the eggs are and the fewer the number of bacteria on the shell, the lower the bacterial count of the liquid egg will be.

It is a standard practice to wash and sterilize the egg breaking cup, knife and tray whenever an inedible egg has come in contact with them. A single bad egg may contain billions of bacteria. Even though the inedible egg is discarded, millions of bacteria will stick to the equipment unless it is cleaned and sterilized. One square centimeter of breaking knife surface, used continuously for a long period of time, contained 6,000,000 bacteria. Washing and rinsing the knife but not sterilizing it, brought the number down to 360,000.

There may be a build up of bacteria in liquid egg passing through equipment. The longer equipment is used without cleaning, the greater the bacterial content of the liquid passing through it.

Plants which clean their equipment four times a day—in the middle of the morning, during the noon hour, in the middle of the afternoon and at the end of the day—have been able to produce liquid egg products that had low bacterial counts.

Freezing and Storage Methods

The investigation determined that freezing time and temperature as well as storage temperature affect the quality and bacterial content of frozen eggs:

Liquid egg placed in a freezer in which the temperature was maintained at 0 F., or below, cooled quickly to the freezing point, about 28 F. They remained in liquid form at this temperature for several hours until the latent heat was removed. They then solidified and the temperature dropped quickly to a point near that of the freezing room.

Whole egg and plain yolk froze at about the same rate of speed. Egg white froze slower than either. The addition of 10 per cent salt to yolk lowered the freezing point about 20 degrees.

Ten-pound cans of whole egg froze in about 60 per cent of the time it took 30-pound cans to freeze.

Thirty-pound cans of whole egg froze to 0 F. in 28 hours when frozen in still air at —24 F. It took 32 hours to freeze 30-pound cans at —15 F. and more than 44 hours to freeze them at 0 F.

Directing a mild blast of air against 30-pound cans of

[1] U. S. Egg and Poultry Magazine, Jan., Feb., March, 1949.

whole egg reduced the freezing time about 50 per cent. It also speeded up freezing cans in the center of the stack.

Freezing whole egg and plain yolk at 0 F. and storing them at that temperature for three or four days destroyed more bacteria than freezing these products at —10 F. or —18 F.

However, don't get the idea you can set the thermostat at 0 F, fill up the freezer with cans of warm liquid egg and still have a freezer temperature of 0 F. Such a procedure may raise the freezer temperature to 10 F. or even 20 F. And at those temperatures liquid egg may sour before it freezes.

Storing-frozen egg products at 0 F. for several months killed as many bacteria as storing them at lower temperatures did.

Approximately 90 per cent of the bacteria in liquid egg products were destroyed during a six-month freezing and holding period.

Bacterial destruction was most rapid during the first few weeks of storage.

Proper Defrosting Important

The bacteria which survive in eggs during preparation, freezing and storage will multiply at a rapid rate under defrosting procedures which allow the temperature of the eggs or egg products to rise too high.

Frozen yolk in 30-pound cans defrosted faster than either whole egg or white in similar quantities. The whole egg defrosted quicker than the white.

The 30-pound cans defrosted in 20 to 24 hours when immersed in cold (58 F.) running tap water. It took 36 to 42 hours to defrost them in still air at a room temperature of 68 F., only 20 to 26 hours when a mild air blast was directed against these cans. It took 40 to 48 hours to defrost the product when the cans were set in a room held at 55 F.

Shaking cans of frozen egg while they are defrosting shortens the defrosting time and helps keep bacterial counts low.

Bacteria increased in nearly all the cans during the first 24 hours of the defrosting period. They increased fastest in yolk, slowest in white.

Bacterial increase was less marked in cans defrosted in 58 F. running water than in cans held at a room temperature of 68 F.

Frozen egg held at 55 F. for as long as 48 hours showed no detrimental increase in bacterial content.

Differences in the bacterial flora in different lots of egg probably account for wide variations in the rate of bacterial increase during the defrosting period.

Fairmont Names New Vice-Presidents

THREE new vice-presidents were elected by Fairmont Foods Co., one of the country's largest processors of frozen foods, Fairmont, Minn., at its annual stockholders meeting in Omaha, Neb., and President L. E. Hurtz said the company's earnings dropped from $2,322,851 for 1947 to $1,219,353 last year because of the freak condition of the butter market the last half of the year. Losses on egg inventories amounted to $301,000.

The new vice presidents are John H. Randolph, Parkersburg, W. Va., divisional manager of the territory served by the Imperial Ice Cream Company, Parkersburg, which Fairmont acquired in 1945; Erhart D. Edquist, divisional manager of Fairmont plants in Kansas and Oklahoma; Neil R. Baker, manager of the Columbus, O., plant. The last named will head an operating division of the company which is being formed in Ohio and surrounding states.

Consumers Institute Recommends Packaging for Frozen Foods

TO HELP homemakers package foods for freezing and long-time storage in a home freezer, the General Electric Consumers Institute has compiled a recommended list of ten types of available packaging materials. The recommendations are based on continuous materials tests made by General Electric homemaking experts and engineers with all kinds of freezable foods.

In issuing the list, the Consumers Institute said that all the approved materials give satisfactory protection against loss of moisture, and resultant drying out of the packaged foods. "These are the only materials we know of," it said, "in which foods can safely be wrapped for storage of up to a year. Ordinary paper or cardboard should never be used." The list follows:

Aluminum foil, cellophane, Pliofilm and polyethylene are used for wrapping irregularly shaped foods such as meat, fish, fowl, cakes and pies. Aluminum foil should be molded around the food to be stored to eliminate air, and it should then be folded in the same way that a drugstore wraps packages. No stockinette is necessary, but a special pencil or ink is needed to label the package. The foil is reusable if handled carefully. It must be at least .0015 inch thick. Thinner foil is for ordinary household use only.

Cellophane should be drugstore-wrapped and protected with stockinette. For best results it should then be sealed with a hot iron. The package is easily labeled by inserting a card inside of the stockinette or tying a tag to the package. The cellophane is not generally reusable. Pliofilm, which may be reused, is handled like cellophane. Heat sealing is more difficult unless a special sealing device is used.

Polyethylene should be drugstore wrapped. Stockinette is not required but is desirable to eliminate air pockets in the package. The package can be held together with string or tape if stockinette isn't used. The material should be heat sealed, preferably with a special device. It is reusable, and is very rugged and pliable even at zero.

Cellophane, Pliofilm and polyethylene bags without cartons are used for wrapping irregularly shaped foods and for dry packaging of vegetables. These bags come closest to being all-purpose packaging materials, but are not recommended for liquids. Cellophane bags should be made of two thicknesses and should be heat sealed. Pliolfim and polyethylene bags can be heat sealed, or the top may be twisted and tied in a knot or folded over and fastened with string or a rubber band. Polyethylene bags are definitely reusable. Pliofilm is reusable if handled with moderate care. Cellophane usually cannot be used again.

Waxed Materials

Waxed folding cartons, which must incorporate a cellophane, Pliofilm or polyethylene bag or liner, are used for dry packaging of vegetables or cuts of meat and fish small enough to fit. The boxes are lightly waxed and give extra protection against drying out of the food; but their main functions are to protect the liner from tearing and to facilitate stacking in the home freezer. The cartons fold flat when not in use. They can be filled from one end or from one side.

Heavily waxed cartons requiring no liner are used for liquid or dry packaging. They come in several sizes and shapes. The tub-shaped carton with disk-like snap-in lid is easy to fill, and the contents can be removed without complete thawing. The cartons stack well in the freezer and nest together when empty. They waste freezer space, however, because they are round.

The square carton with full-opening top and molded plastic cover also has tapered sides, which permit easy stacking and emptying. The lid is easy to apply and remove and can be used indefinitely (cartons can be purchased without lids). The cartons stack well in the freezer and use space efficiently.

Plastic Container

Molded clear plastic containers are also used for liquid or dry packaging. They are square, with tapered sides, and nest or stack easily. The full-opening top permits removal of food without thawing. The cover is flexible to provide a good seal, and is easily applied and removed. The entire container can be used over and over again.

Another container for liquid or dry packaging is made of heavy aluminum foil. This is not ideal for liquids because sides are not as rigid as the molded plastic container. Another slight drawback is the fact that the heavy foil lid must be crimped on with a special tool. This isn't a difficult job, but is something of a nuisance.

On the other hand, the aluminum foil container has a unique advantage in that the frozen food it contains can be cooked right in it. And because aluminum is a good heat conductor, food is frozen faster in this carton than in others. The container is rectangular and has tapered sides and consequently stacks and nests well. Because of the lid, however, it is not reusable.

A fourth type of container for liquid or dry packaging is the glass freezer jar, specially designed for use in home freezers. This has a full-open mouth so that contents can be removed without thawing and has a flat top so that one jar stacks easily on another. They do not nest when empty, however, and the round shape wastes freezer space. They are reusable indefinitely.

The Consumers Institute points out that ordinary glass canning jars can also be used for freezing foods, but because of the small mouth the food must be completely thawed before it can be removed.

Fresh Orange Juice Keeps Flavor on Long Trips to Market

FRESH, refrigerated orange juice, prepared and packaged by a new process, is now being shipped commercially from citrus-producing areas to distant markets without loss of flavor or other qualities, the U. S. Department of Agriculture announces.

Ordinarily, orange juice would lose much of its flavor after only a few days in transit and storage. But Bureau of Agricultural and Industrial Chemistry researchers at Pasadena, Calif., working in cooperation with citrus processors, have devised a large-scale, commercial method for producing and packing the juice so that it retains good taste quality and vitamin-C content for two weeks or longer. Even after three weeks in refrigerated storage, this product is superior to heat-processed canned orange juice.

Development of the new process, which provides an additional means of moving the country's increasing crop of healthful oranges into economical consumption, was undertaken in 1946 by Dr. E. A. Beavens, in charge of the Bureau's new Pasadena Research Laboratory, and one of his associates, Dr. J. C. Underwood. Most of their work was done at the laboratory maintained by the Bureau until recently at Los Angeles. Object of this research was to find a way to protect the flavor and nutritional quality of fresh, unpasteurized, single-strength orange juice for a period long enough to permit wide distribution.

The method now in commercial use involves careful reaming of the fruit, so that very little peel oil gets into the juice. Too much of this oil will hasten development of off-flavors. The prepared juice is quickly chilled to 30 F and kept at this temperature until used.

Carload lots of this fresh orange juice, packed in 1-gallon cans and refrigerated with ice and salt, have been shipped successfully from Los Angeles to New York City. The present production in southern California, which amounted last year to almost 2½ million gallons, is currently distributed to nearer cities. Ten plants of varying size are now using the process on a year-round basis in California. A large part of their output is shipped by refrigerated truck to consumers within a radius of 500 miles.

Production Details

Strict control of all steps in the process, from selection of fruit through preparation and shipment to final distribution, is necessary to insure the superior quality of this fresh orange juice. The fruit is first thoroughly washed and dried. Cutting and reaming is done very carefully to keep as little peel oil as possible from getting into the juice. Heavy solid particles and seeds are screened out. The juice is then deaerated to remove most of the air it contains and chilled quickly to 30-32 F. It is filled into bottles, cartons, or cans without headspace, that is, to the tops of the containers, and the containers are tightly closed and sealed. The juice must be kept at 30 F. until consumed in order to preserve its fine flavor. This temperature is several degrees lower than that generally maintained in household refrigerators.

Orange juice prepared by this method will retain its flavor and vitamin-C content for two weeks or longer under refrigeration. The particles of pulp left in the juice do not settle to the bottoms of containers, and during the short period in which the juice is normally shipped and stored its microbial count (indicating presence of microorganisms, including bacteria) actually decreases if the product is held consistently at 30 F.

Bureau researchers point out that this orange juice must compete with other products now on the market, such as canned juice, the new frozen concentrated juice (developed by the Florida Citrus Commission and citrus industry in cooperation with the Bureau's laboratory at Winter Haven, Fla.), and the fresh fruit itself. Main economic advantage of the process is that it enables restaurants and other large users of orange juice to save on costs of preparing this food for their customers. It also assures them of a high-quality product. In buying these products, users share in the advantages of modern, large-scale, labor-saving devices developed for food processing. Many families also are interested in obtaining high-quality fresh orange juice ready for consumption.

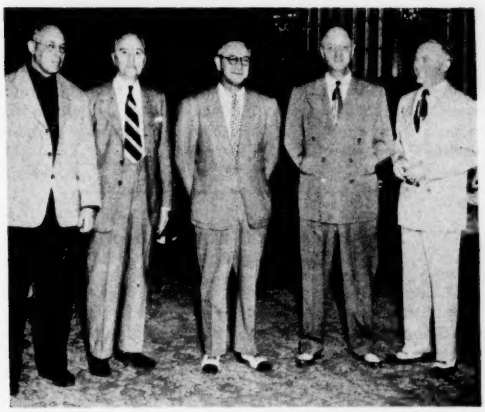
Uniform Air Flow in Blast Freezer

LACK of uniform air flow in a blast freezer may explain why freezing is faster in some positions than in others. In tests on one commercial freezer, engineers from the Western Regional Research Laboratory (U.S.D.A. Laboratory in Albany, Calif.) found that 12-ounce packages of limas varied from 4.5 to 8.75 hours in time required to reach 0 F. These engineers use an improved anemometer that makes air-flow measurements in various positions possible. Their equipment and methods simplify performance testing of blast freezers. No interruption of the operation is necessary.

Air Conditioning and Refrigeration Manufacturers Discuss Future

IN three days of meetings at Hot Springs, Va., the Air Conditioning and Refrigerating Machinery Association culminated an unusually-successful year's operations. Speakers at the sessions were in agreement that the coming year was one which would call for the utmost in capable management, practicing every possible economy on production and distribution while aggressively employing the almost-forgotten art of selling in a buyers' market.

"The great market for the products of our industry is still waiting for us," said George S. Jones, Jr., of Servel, Inc., retiring president, "but we must re-learn the lessons of the 1930's and go to the market prepared to sell instead of waiting for the market to come to us as it has during the past few years." W. H. Aubrey of Frick Company, Inc., newly-elected Association president, said "The refrigeration and air conditioning industry, with products so essential to the national economy, is at the threshold of the greatest period of growth in its history. But the next year or two will demand many readjustments in both individual and corporate planning and practice if advantage is to be taken of the opportunity. The post-war years have left some of us with too much fat in the wrong places."



Officers of the Air Conditioning and Refrigerating Machinery Association, elected at the Association's Annual Meeting. Reading from the right are: Past-president and Chairman of the Executive Committee, George S. Jones, Jr. (Servel, Inc.); President, W. H. Aubrey (Frick Co., Inc.); First Vice-president, A. P. Shanklin (Carrier Corp.); Treasurer, G. A. Heuser (Henry Vogt Machine Co.); Second Vice-president, H. F. Smiddy (General Electric Co.).

George Taubeneck, editor and publisher of Air Conditioning and Refrigeration News and guest speaker at the ACRMA luncheon said, in the course of his remarks, "Today presents a golden opportunity for the young and hungry salesman, out to make a name for himself—and a fortune."

Reports to the meeting sessions revealed substantial progress in the many fields in which the Association is active. Especially noteworthy was the leading part played by ACRMA in the revision of the safety code for mechanical refrigeration and in the development of standards for both the industry's products and their application. Seven new or revised standards were added to the already-long list of ACRMA accomplishments in this field of engineering. These included water-cooling towers for use with refrigerating equipment; room air conditioners; self-contained air conditioners; condensing units 20 hp. and smaller; high-speed ammonia compressors; refrigeration heat transfer and compression refrigeration systems. These additions will be published and made available to the industry this summer.

Considerable advance was also reported in the development of the association's statistical program.

Officers Elected

Association officers elected for the year 1949-50 were:

President, W. H. Aubrey, Frick Company, Inc.

First vice-president, A. P. Shanklin, Carrier Corp.

Second vice-president, Harold F. Smiddy, General Electric Co.

Treasurer, G. A. Heuser, Henry Vogt Machine Co.

Chairman, Executive Committee, George S. Jones, Jr., Servel, Inc.

In addition to the Association officers, the following were elected members of the Board of Directors: A. J. Bronold, Westinghouse Electric Corp.; Maynard Ford, Parks-Cramer Co.; S. E. Lauer, York Corp.; Edward R. Legg, Refrigeration Corp. of America; H. F. Lehman, Frigidaire Division, General Motors Corp.; W. C. Newberg, Airtemp Division, Chrysler Corp.; A. B. Newton, Acme Industries, Inc.; T. S. Pendergast, Baker Refrigeration Corp.; D. Robertson, Universal Cooler Division, Newport Steel Corp.; A. O. Vogel, Vilter Manufacturing Co.; Edmund R. Walker, Fedders-Quigan Corp.; G. E. Wallis, Creamery Package Manufacturing Co.; C. E. Wilson, Worthington Pump & Machinery Corp.

Dutcher Joins National Association of Frozen Food Packers Staff

A. W. DUTCHER has joined the staff of the National Association of Frozen Food Packers, according to an announcement from the Association's headquarters in Washington. He will devote his time to research and standards problems, working closely with the Association's committees and counsel in developing data that will be needed in connection with future Food & Drug Administration standards hearings.

Mr. Dutcher comes to the Association with a broad academic and practical background in food processing. He was graduated from Pennsylvania State College, with a B.S. Degree in Bacteriology, and subsequently has been employed by a number of companies in the food processing field. Prior to his employment by the Association, Mr. Dutcher's most recent position was with the Chief Boy-Ar-Dee Quality Foods, in the capacity of manager of the manufacturing department.

A wide range of assignments in food processing work has been included in his experience. He has been responsible for quality control work, laboratory analysis, development of methods and equipment, production scheduling and maintenance, labelling problems, and development of raw product standards.

From Farm to Freezer

AN extension bulletin "From Farm to Freezer" has been issued by the Extension Service of the State College of Washington, giving some instructions on making the best use of refrigerated lockers. It tells why foods should be frozen, discusses the kinds of containers and wrappers and gives general tips on freezing. It is illustrated and provides a valuable reference for those using locker service.

Storage of Vegetable Seeds

(Continued from page 46)

of the information given above is from U. S. Dept. of Agriculture Leaflet No. 220, "Storage of Vegetable Seeds" by E. H. Toole, published in May, 1942. Most of this information is, however, applicable to other seeds.

It is generally known that for long periods—beyond the usual one year—viability is maintained better at lower temperatures, as the following quotation indicates:

"For the great majority of seeds, below freezing temperatures are coming to be regarded as better for keeping their viability over long periods of time than temperatures above freezing. Up to five years of storage, there were no differences in germination capacity of seeds stored at 5 C. (41 F.) and —4 C. (25 F.) (Boyce Thompson Institute tests). However, as storage period lengthened, the superiority of the lower temperature was demonstrated in all cases."

The following conclusion on soybean storage (U. S. Dept. of Agriculture Circular 753 by E. H. Toole and V. K. Toole, Sept., '46) illustrates the same principle:

"With natural moisture content of 13.5 per cent the seed was dead after five months at 30 C. (86 F.) and after two years at 20 C. (68 F.). Full viability was kept for three years at 10 C. (50 F.), but germination fell rapidly after that. Seed dried to 8 or 9 per cent moisture showed little or no loss of germination at 30 C. for one year, but the fall in germination was very rapid after one year."

Summary

1. Two factors are important in storage of almost every kind of seed—moisture content and temperature. If either is high, the other must be low.

2. Cold storage at 50 F. is sufficiently low, provided humidity also can be controlled.

3. At lower temperatures (40 to 50 F.) high humidity is not so serious as at high storage temperatures; however, 50 per cent rh is desirable and 70 per cent should not be exceeded. Even at low temperatures (50 F.) contaminating fungi may develop at humidities approaching 80 per cent.

Effect of Storage Upon Asparagus

(Continued from page 24)

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Book Review

HEATING, VENTILATING AND AIR CONDITIONING GUIDE 1949. Published annually by American Society of Heating and Ventilating Engineers, New York. 1384 pages. Blue cloth binding. Price $7.50. For sale by Nickerson & Collins Co., Chicago 44, Ill.

This 1949 edition of the Heating Ventilating and Air Conditioning Guide contains the most extensive technical data section thus far, with 992 pages and a 392 page catalog section of the products of 249 manufacturers, the total of 1384 pages being the largest yet issued. Many special features and numerous revisions brings the technical data up to date with current practice and the most recent research. Both the technical data section and the catalog data section are cross indexed. The list of codes and standards applicable to heating, ventilating and air conditioning practice has been enlarged to include 115, which are of importance to the practicing engineer in this field. Another special feature is a new section on space heaters added to the chapter on heating boilers, furnaces and space heaters.

The theory and mathematical background for fluid flow computations in the chapter on Fluid Flow have been enlarged, and a section has been added on variable flow meters. In the chapter on Physiological Principles, revisions have been made in sections relating to human reactions to extremes of hot and cold environments bringing the data on these effects up to date.

Standards for Brass or Bronze Screwed Fittings

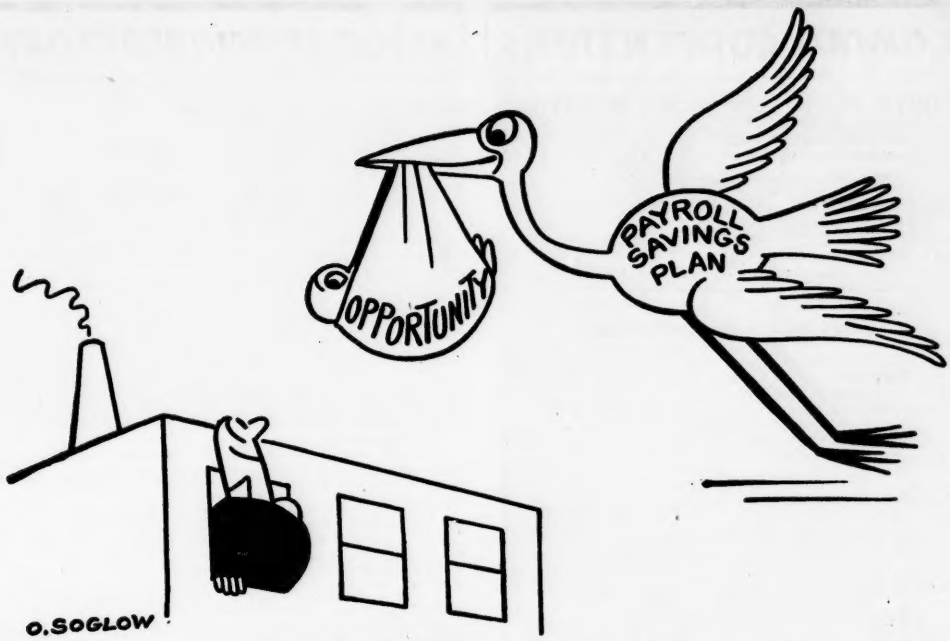
NEW American standards for brass or bronze screwed fittings have been adopted and printed. The American Standards Association gave its approval to these standards April 6, 1949. An important phase of their value to industry will be the general acceptance of these standards and to that end all those interested are urged to take an active part in their promulgation and use. Copies may be obtained from The American Society of Mechanical Engineers, 29 West 39th St., New York.

Rail Fair to Have Summer Ice Show

AN OUTDOOR ice skating show on the shore of Lake Michigan will be a free attraction during the Chicago Railroad fair this summer, Maj. Lenox R. Lohr, president, announced recently. The half hour show will be given at least six times daily on a specially constructed rink of 1,000 square feet just north of the fair's main entrance at 23d St. Grandstand seats for 1,200 have been erected. Entertainment will include an all girl ensemble, specialty acts and an orchestra. Cost of the show is underwritten by the companies that furnish the equipment, materials and supplies to the railroad industry.

New Dry Ice Plant

A NEW plant for the manufacture of dry ice has been started near Roy, N. M. Foundations will be made for the installation of three presses which will provide a capacity of 30 tons daily. Backed by Chicago capital, the new concern is headed by C. W. Tudor, rubber company executive, as president, and is understood to be capitalized at 2½ million dollars. The company will be operated under the name of Iceco.



Put more opportunity into your company's future

WITH THIS

FIVE-STEP PROGRAM

Here's an easy-to-follow program that will substantially increase your company's chances for a prosperous future.

Nation-wide experience in 20,000 companies proves that this popular program also pays off handsomely *today*. It increases each participating employee's peace of mind—making him a more contented, more productive worker. It reduces absenteeism, lowers accident rates, increases output, and improves employee-employer relations!

This program is simply a proved formula for building membership in the Payroll Savings Plan—the "automatic" system by which millions of workers are investing in U. S. Savings Bonds every pay-day.

What Are the Five Steps?

The benefits of the Payroll Savings Plan to your company are in proportion to the percentage of employees who participate. Nation-wide experience indicates that 50% of your employees can be persuaded to join *without high-pressure selling*. Here are five steps which have proved to be the "magic formula" for putting over the Plan. They will get results for you:

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.

4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Check up on the Payroll Savings Plan in your company. If fewer than half of your employees are participating, you have a lot to gain by following the five-step program outlined here. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bond Division. While it's on your mind, why not call him right now? Or write the Treasury Department, Washington 25, D. C.

Are You With It?

In the current national Savings Bonds campaign, May 16-June 30, the Treasury Department asks each company operating the Payroll Savings Plan to canvass all employees, with the goal of having at least half of them signed up by the end of the month. This advertisement tells how you can achieve that goal most easily.

The Treasury Department acknowledges with appreciation the publication of this message by

ICE AND REFRIGERATION

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

COMING CONVENTIONS

NATIONAL FROZEN FOOD LOCKER ASSOCIATION
August 28-31, 1949
Stevens Hotel, Chicago, Ill.
S. A. WARRINGTON, Secretary

DELTA STATES ICE ASSOCIATION
November 28-30, 1949
Buena Vista Hotel, Biloxi, Miss.
R. N. MILLING, Secretary

Sales and Reorganizations

Independence, Calif.—Owen and Roy Lewis of Cartago, owners and operators of Owens Valley Dairy Service have taken over management of Howard's Frigid Supply ice service. The Lewis,' who have had the dairy service for some time, plan to continue the locker and ice service at the county seat. They will have their headquarters here, they said.

Hill City, Kans. T. S. Miller of Pendleton, Ore., bought the Hill City Ice Co. recently from R. L. Garrison.

Lincoln, Kans.—The Schlappy Ice Co. has been sold to Robert Chard, John Schlappy recently announced.

Delano, Minn.—John Anderson and Sons have purchased and taken over the operation of the Schumacher Ice Co. here.

Charleston, Mo.—The Public Ice Service Co. of Cairo, Ill., has purchased the ice business and ice-making facilities from the Missouri Utilities Co. here.

Broken Bow, Nebr.—The city council recently approved the sale of the ice plant property which it had acquired three years ago when the city purchased the Consumer Public Power District holdings, to the Kohlman-Warner Co. The transfer includes the ice storage building and the ice manufacturing building.

Timmonsville, S. C.—Southern Cities Ice Co., Raleigh, N. C., has purchased the plant and property of the Timmonsville Ice & Fuel Co. Inc., here. The purchasing company is a subsidiary of Consolidated Electric and Gas Co., New York.

Llano, Tex.—The Llano Ice & Cold Storage Co. has been sold by George W. Riddell to Stother Jones, Jr., who is operating the business.

Fires and Accidents

Mayport, Fla.—Fire caused an estimated $40,000 damage to the building and contents of the Mayport Cold Storage and Ice Co. recently. The blaze apparently started when a compressor belt in the plant slipped off its pulley and damaged electric wiring. Four fuel oil tanks nearby exploded but an underground gasoline storage tank was undamaged.

St. Paul, Minn.—An abandoned two-story icehouse belonging to the Minnesota Transfer Railway Co. was recently destroyed by fire. Carl L. Lamphere, superintendent, estimated the loss in excess of $25,000. It is believed the fire started from a spark from a passing locomotive.

Icy Items

Hammond, La.—Notice of dissolution of incorporation has been filed by Independence Cold Storage Corp.

Austin Tex.—The Southwestern Ice & Cold Storage Co. amended its charter recently, increasing its capital stock to $100,000.

ASSOCIATION DIRECTORY

AMERICAN INSTITUTE OF REFRIGERATION
H. T. McDermott, Gen. Secretary, 433 N. Waller, Chicago 44, Ill.

NATIONAL ASSOCIATION OF ICE INDUSTRIES
Mount Taylor, Secretary, 1706 L St., N. W., Washington 6, D. C.

NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES
Wm. Dalton, Exec. Vice-Pres., Wm. M. O'Keefe, Secy., Tower Bldg., Washington 5, D. C.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATING ENGINEERS
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CANADIAN ASSOCIATION OF ICE INDUSTRIES
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EASTERN STATES ICE ASSOCIATION
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FLORIDA ICE ASSOCIATION
Muriel Washburn, Secretary, 1931 Silver St., Jacksonville, Fla.

ILLINOIS ASSOCIATION OF ICE INDUSTRIES
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INDIANA ASSOCIATION OF ICE INDUSTRIES
Robert W. Walton, Secretary, Board of Trade Bldg., Indianapolis, Ind.

KANSAS ASSOCIATION OF ICE INDUSTRIES
C. A. Berkihiser, Manhattan Ice & Cold Stg. Co., Manhattan, Kans.

KENTUCKY ICE MANUFACTURERS' ASSOCIATION
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MICHIGAN ICE INDUSTRIES ASSOCIATION
Wm. J. Campbell, Secretary, Pleasant St. at Campbell, Belding, Mich.

MISSOURI ICE MANUFACTURERS' ASSOCIATION
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MOUNTAIN STATES ASSOCIATION OF ICE INDUSTRIES
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NEBRASKA ASSOCIATION OF ICE INDUSTRIES
Frank Vogelsang, Secretary, W. T. Good Ice Co., Lincoln, Nebr.

NEW ENGLAND ICE ASSOCIATION
Raymond Wilber, Secretary, 419 Boyleston St., Boston, Mass.

NEW YORK STATE ASSOCIATION OF REFRIGERATED WAREHOUSES
Chas. G. Ashe, 101 Columbia St., Buffalo 5, N. Y.

NORTH CAROLINA ICE ASSOCIATION
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NORTHWEST ASSOCIATION OF ICE INDUSTRIES
D. D. Stewart, Secretary, American Bank Bldg., Seattle, Wash.

OHIO ASSOCIATION OF ICE INDUSTRIES
Guy W. Jacobs, Secretary, The Steubenville Ice Co., Steubenville, Ohio

OKLAHOMA ASSOCIATION OF ICE INDUSTRIES
W. A. Hadley, Secretary, 242 Key Bldg., Oklahoma City, Okla.

PACIFIC STATES COLD STORAGE WAREHOUSEMEN'S ASSOCIATION
L. A. Bailey, Secretary, 461 Market St., San Francisco, Calif.

SOUTH CAROLINA ICE MANUFACTURERS' ASSOCIATION
Geo. L. English, Secretary, P. O. Box 603, Columbia, S. C.

SOUTHERN ICE EXCHANGE
Wilshire Riley, Secy.-Counsel, Mercantile Bank Bldg., Dallas, Tex.

TENNESSEE ICE MANUFACTURERS' ASSOCIATION
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TRI-STATE ASSOCIATION OF ICE INDUSTRIES
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VIRGINIA ICE MANUFACTURERS' ASSOCIATION
H. H. Snyder, Secretary, Alexandria, Va.

WEST VIRGINIA ASSOCIATION OF ICE INDUSTRIES
E. Dana Smith, Secy., Diamond Ice & Coal Co., Charleston, W. Va.

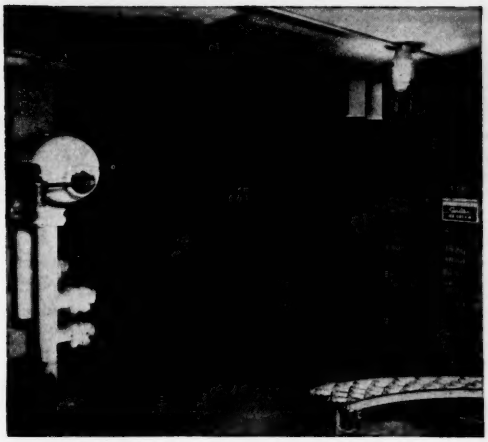
WISCONSIN ASSOCIATION OF ICE INDUSTRIES
Paul F. Hoff, Secretary, 1300 East Locust St., Milwaukee, Wis.

Rubel Estate Eight Million Dollars

HOLDINGS left by the late Samuel Rubel, head of the Mountain Ice and Fuel Corp. of 97 Central Ave., Jersey City, were estimated at 8 million in an application for letters of administration of the estate filed in surrogates court by his widow, Mrs. Dora N. Rubel. His estate will go in approximately equal shares to Mrs. Rubel and two daughters. Mr. Rubel died on April 29 at the age of 66 without leaving a will.

New Incorporation

Coolidge, Tex.—A 25-year charter of incorporation was granted the Coolidge Ice and Frozen Foods, Inc. recently. Authorized capital stock was listed at $10,000. Incorporators are Mrs. Georgia Hall, Will K. Hall and William K. Hall, Jr.



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The Niagara "No Frost" Method saves you from any loss, delay, shut-down, or diminished efficiency from frost on your refrigerating coils, at any time. You always get the full capacity that you paid for when you bought your refrigerating plant.

See how this means money savings. You run with higher suction pressures and lower head pressures, saving power. Your wear and tear and maintenance is lower; you save the loss of production and the labor used in defrosting periods. You save the power that is wasted when refrigeration is supplied through coils that are frost-coated.

The Niagara "No Frost Method" is not just a means of defrosting. It is a means of operating refrigeration without the formation of frost at any time, reducing costs, quickly paying for itself.

There are hundreds of successful "No Frost" users who say it is saving money, increasing production and improving quality for them every day . . . in every type of refrigeration installation requiring temperatures below freezing . . . in food freezing, ice cream, cold storage and in special industrial applications.

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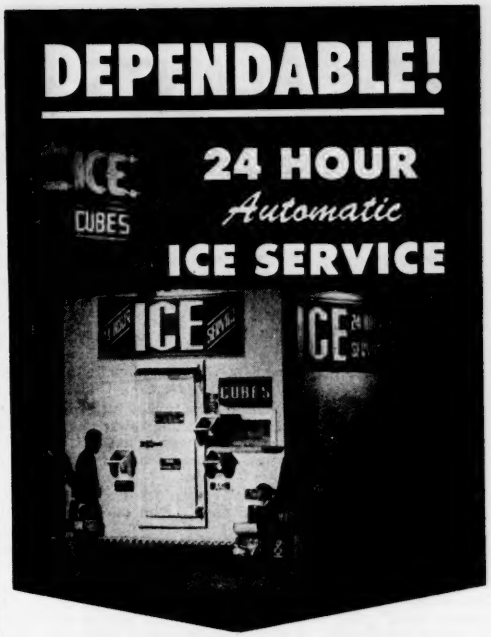

S&S Sturdy-Built *Refrigerated* Ice Vending Stations

Sales of processed and block ice go up . . . while costs go down, when you install S & S Sturdy-Built automatic ice merchandisers. Operating 'around the clock' these profit-builders capture after hour sales to make money for you even while you sleep.

One midwest operator of twenty S & S Sturdy-Built stations writes: "In practically every spot with a vending station, sales have increased over the corresponding months prior to their installation while sales have dropped off at locations without venders."

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S & S Sturdy-Built refrigerated ice vending stations are completely assembled and ready to operate on arrival. Their trouble-free operation has been proved by more than seventeen years of service to the ice industry. Cut your distribution costs . . . and lift your profits with S & S STURDY-BUILT refrigerated ice vending stations.

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Highland Park Station
Des Moines, Iowa

REFRIGERATED STURDY-BUILT ICE VENDING STATIONS

NEW PLANTS AND IMPROVEMENTS

Information pertaining to proposed new plants utilizing refrigerating equipment, as well as additions, improvements, and rehabilitation of existing plants. News regarding such new plants and additions is invited for publication in this department.

ALABAMA

Birmingham, Ala.—The Birmingham Ice & Cold Storage Co. has installed a new S & S Sturdy-Built Ice Vending Station equipped to dispense both block ice and processed ice in paper bags.

CALIFORNIA

Monterey, Calif.—The Union Ice Co. has installed another S & S Automatic Ice Vending Station.

San Leandro, Calif.—Construction of Lucky Stores' new $1,500,000 warehouse and administration offices has begun. The warehouse will be 820 by 200 feet and will include 160,000 sq. ft. of floor space. Construction is expected to be completed by the end of the year.

San Francisco, Calif.—The Western Ice Co.'s new $200,000 plant at 520 Mendell St. has started operating at its full capacity of 60 tons daily.

Santa Barbara, Calif.—Polar Ice & Cold Storage Co. recently installed an additional S & S Ice Vending Station.

Sebastapol, Calif.—Constructon of a new cold storage warehouse at the cannery of O. A. Hallberg & Sons is well under way. The new cold storage unit adjacent to the cannery is expected to extend the working season for the cannery by holding apples until after the end of the harvesting season.

FLORIDA

Fort Pierce, Fla.—Pure Ice Manufacturing Co. of Miami, Fla., plans to erect a new ice plant here at a cost of about $250,000.

Zellwood, Fla.—The Zellwood Ice & Fuel Co. has a new precooling plant located near the Zellwin Farms where corn is precooled.

GEORGIA

Clarksville, Ga.—The James I. Dover Co. has completed installation of an S&S Sturdy-Built Ice Station. Equipment was supplied by F. B. Dickinson Co. of Des Moines, Ia.

Folkston, Ga.—The modern storage plant erected by J. B. Hinson on the grounds of the Folkston Ice & Cold Storage Co., as reported in April issue I&R, began active operation in May. The new enterprise will engage in the icing of produce trucks, as well as carry on a general wholesale and retail ice sales business.

ILLINOIS

Wheeling, Ill.—The Jefferson Ice Co. has taken delivery of another S & S Sturdy-Built Ice Vending Station Model 20-B. This company has also placed a similar unit in operation recently at Cary.

INDIANA

Hammond, Ind.—City Ice Supply Co. has recently installed two S & S Sturdy-Built Ice Vending Stations, Model 20-C.

KANSAS

Caldwell, Kans.—A new building to house a small ice plant has been erected by E. Staley and J. R. Rice. The new plant will take care of local needs and will eliminate shrinkage from hauling ice from other sources.

Lebo, Kans.—Roberts Meat Market has built a new ice house.

North Waco, Kans.—Ice Delivery Co. recently obtained permit to construct a 9x20 ft. metal and frame ice delivery station at a cost of approximately $4,500.

MISSOURI

Cameron, Mo.—The Cameron Ice & Fuel Co. has completely reconditioned the ice plant for the summer season and is operating 24-hours a day, seven days a week. The plant manufacturers 18 tons of ice a day and in addition to Cameron, serves a number of surrounding towns.

NEBRASKA

Clay Center, Nebr.—G. W. Lovercheck has remodeled the former Haith building for installation of a new ice plant.

NEVADA

Reno, Nev.—Crystal Springs Ice Company recently installed another S & S Ice Vending Station. The San Jose, Calif., plant of S & S Vending Machine Co. supplied the unit.

NEW MEXICO

Roy, N. Mex.—Iceco, a new concern backed by Chicago capital and headed by C. W. Tudor, rubber company executive, plans construction of a new dry ice plant with capacity of 30 tons daily. The new company is reported capitalized at 2½ million dollars.

Ruidoso, New Mex.—Bill McCarty has announced the opening of his new business, the "Bill McCarty Ice Co." He will service this town and surrounding vicinity as well as sell directly from his ice house location.

OHIO

Dayton, Ohio—City Ice & Fuel Co. has taken delivery of another S & S Sturdy-Built Ice Vending Station. The station is equipped with four conveyors to vend 25 and 50 lb. blocks and also 25 and 10 lb. bags of processed ice. The unit has a total storage capacity of over six tons.

OKLAHOMA

Cherokee, Okla.—The Alfalfa Ice Co. has installed a gas engine and electric generator. Paul Huffer, manager, says the equipment will be used as a standby to assure uninterrupted power for the plant's freezing and refrigerating system.

Haskell, Okla.—The Haskell Ice Plant is now operating with modern 12-ton capacity machinery according to announcement of I. E. Vernon and Jim Pope, owners. Vernon and Pope bought the plant some months ago and have been supervising extensive repairs of the plant and installation of new equipment.

PENNSYLVANIA

Millvale, Pa.—The Consolidated Ice Co. recently installed an S & S Sturdy-Built Ice Vending Station Model 20-B. This unit not only dispenses block ice but also cubed and sized ice in packages.

SOUTH DAKOTA

Aberdeen, S. D.—The Culbert Co. last month installed an S & S Sturdy-Built Ice Vending Station Model 16-B.

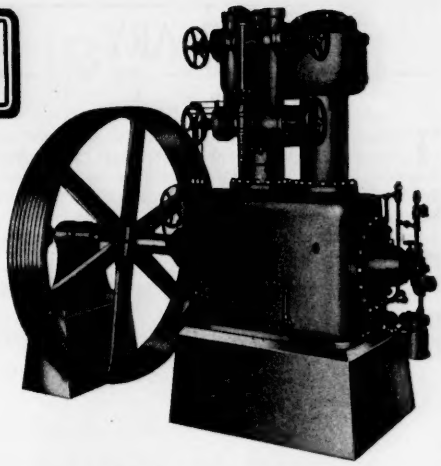
WASHINGTON

Seattle, Wash.—Rainier Ice & Cold Storage Co. last month installed an S & S Automatic Ice Station Model 20-B equipped to dispense 25 and 50 lb. pieces of ice and also 10 lb. packages of processed ice.

WISCONSIN

Madison, Wis.—Pratt's Service is now operating a new S & S Sturdy-Built Ice Vending Station, Model 20-B.

Sterling DEPENDABLE REFRIGERATION



The phrase "STERLING DEPENDABLE REFRIGERATION" is more than a slogan—it's a fact.

Built with rugged strength for endurance, with advanced design for efficiency and economy of operation, STERLING Ammonia Compressors are the product of more than fifty years of "know how" in the manufacturing of refrigeration machinery and equipment.

A complete range of sizes insures the correct compressor for each application.

Deliveries are, at present, reasonably current—some models of compressors are available from stock.

For complete information, see your nearest STERLING distributor, or write the factory.

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- STUDENTS
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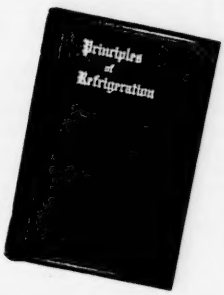

PRINCIPLES OF REFRIGERATION, 3rd Edition (1947) revised by Wm. H. Motz, provides information and data for the practicing refrigeration engineer. Of special interest to erecting and operating refrigerating engineers, refrigeration machinery sales engineers, persons employed in building refrigerating machinery and those employed in ice making, cold storage plants or other establishments equipped with refrigerating machinery. Contains information that the refrigerating engineer should know in order that he may have complete and up-to-date knowledge.

Written in every day language and as free as possible from higher mathematics. The theoretical and fundamental operating principles are given attention first—followed by numerous practical considerations and the application of principles to the economic production of ice and refrigeration for various purposes.

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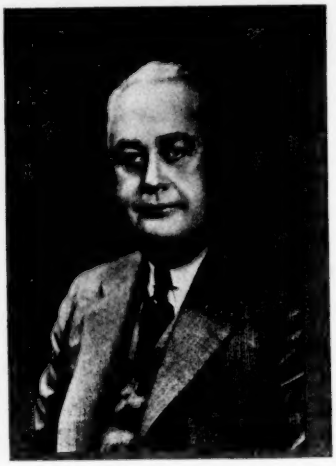
OBITUARY

Oliver P. Fauchier

THE ice industry of Indiana suffered the loss of an outstanding leader in the death, May 25, of Oliver P. Fauchier, executive secretary of the Indiana Association of Ice Industries and formerly chairman of the Unit Ice Secretaries Association. He had been ill in an Indianapolis hospital for some weeks and his death resulted from a heart ailment. He was 73 years of age.



Oliver P. Fauchier

Mr. Fauchier, known as "Ollie" to his many friends and acquaintances throughout the industry, had been executive secretary of the Indiana Association for the past 18 years. He had made a distinct place for himself not only in the ice industry but among trade association circles. He served as secretary-treasurer of the Indiana State Trade Executives Association and in this and other business activities, his wise counsel and advice were always sought and his judgment was backed up by an enthusiasm and interest that endeared him to all who were privileged to know him.

He was born in Howard County Indiana in 1877, coming to Indianapolis with his parents in 1892. In 1900 he moved to Chicago and returned to Indianapolis in 1914 where he had lived continuously since that time.

He was a pioneer in the distribution of motion pictures in the Indianapolis area and had served as a salesman and branch manager of various motion picture companies of his time, many of which are out of business or have been consolidated with other companies including the World Film Corp., Universal Pictures, Pathe Exchange, Special Pictures Corp., and Bingham Crosse & Cohen, state ice distributors. During the first World War, he owned and operated a motion picture theater in southern Indianapolis. In 1925 he joined the staff of the Portland Cement Association doing promotional work for this organization until 1931 when he was appointed executive secretary of the Indiana Association of Ice Industries.

He was a member of the Friends Church, Ancient Landsmark Lodge No. 319 and of the B.P.O.E.

He is survived by a brother, Robert E. Fauchier of Chicago, a sister, Mrs. M. E. Parr of Sheridan, Wyo., and a stepsister, Mrs. Clyde Abbott of Paisley, Ore. Mrs. Fauchier died a few years ago.

Howard W. Smith

THE death of Howard W. Smith, president of the Smith Coal & Ice Co., Tiffin, Ohio, occurred suddenly Tuesday, May 17, at his home in Tiffin. Death resulted from a heart ailment. He had been active right up to the time of his passing, having been at his office all day as usual. He was slightly more than 50 years old.

Mr. Smith was one of Tiffin's most successful and widely known business men. In addition to heading the coal and ice company, he was president and general manager of the Pure Milk & Dairy Co., and director of the Tiffin Savings Bank and of Webster Mfg. Inc. He was a former director of the Chamber of Commerce and served as councilman on the City Council some years ago. He was a past master of Clinton Council Royal and Selected Masons and member of the Ancient and Accepted Scottish Rites and of Zenobia Shrine in Toledo.

He had been an active member of the Ohio Association of Ice Industries since its organization 30 years ago and on several occasions had served as a member of the board of directors. He graduated from Columbian High School in 1915 and attended Heidelberg College where he played on the football team. He was a member of the First Presbyterian Church.

He lived in Tiffin throughout his entire life, having followed in the footsteps of his father in the ice business. The company which was founded by his father and bore his name, was established in 1887. He will be missed in that community because he contributed much to its success and growth throughout the years.

He leaves his widow, Mrs. Frieda Zechiel Smith and two sisters.

David Copeland

THE death of David Copeland, Utica, N. Y., president of the Copeland Ice Co., occurred May 11 at his home in Utica after a long illness. He was 67 years old. Besides managing the ice company which bore his name, he was a prominent business man and well known Jewish philanthropic leader in Utica.

Mr. Copeland had operated the Copeland Ice Co. for about 40 years. He was born in Germany and came to Utica with his parents 50 years ago and had lived there since that time. He was a member of Temple Beth El and active in its work, of Moriah Lodge F. & A. M., Utica Lodge Loyal Order of Moose, and Shenandoah Lodge Independent Order of Odd Fellows. Survivors include three daughters. His wife died some time ago.

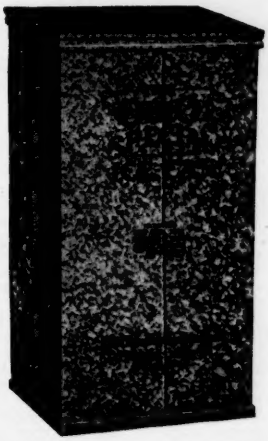
Taking his place as head of Copeland Ice Co., C. W. Davis of the C. W. Davis Supply Co., Syracuse, N. Y., has been appointed. Mr. Davis had been associated with Mr. Copeland for over 20 years.

Stephen E. McPartlin

THE death of Stephen Emmet McPartlin, a pioneer in refrigeration installation, founder, and until his retirement in 1947, president of the Union Insulating Co. of Chicago, occurred June 12 in St. Francis Hospital, Evanston, Ill., after a two year illness. He was 74 years old.

Born in Oshkosh, Wis., Mr. McPartlin was sales manager of the Union Fiber Co. of Winona, Minn., before starting his own business. He was a member of the original board of directors of the Celotex Co. He belonged to the Salmagundi Club of New York and was a life member of the Art Institute of Chicago. Surviving are his widow, the former Anne McGoorty; a daughter, Mary L., and three sons, Stephen E. Jr., John J. and the Rev. Richard J. McPartlin, S. J.

OHIO SPECIAL ICE CANS



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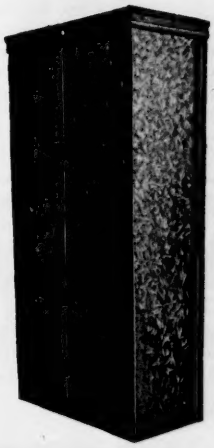

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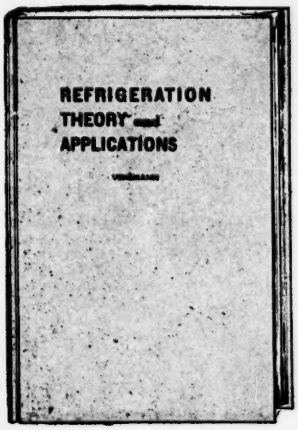

REFRIGERATION THEORY and APPLICATIONS

(Second Edition, 1946)

WHETHER you **OPERATE A PLANT, INSTALL, SERVICE, SELL** refrigeration equipment, or are a **STUDENT** of refrigeration, this book gives you the basic facts and principles involved in the processes of mechanical refrigeration. Now, more than ever before, today's conditions demand your thorough knowledge and understanding of these pertinent facts.

Too often "force of habit" methods make the refrigeration man lose sight of the knowledge that contributes so greatly to a complete and thorough understanding of efficient operation.

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336 pages—6x9 inches
17 Fold-in Inserts
90 Illustrations — 156 Problems

No other book offers such a comprehensive treatise on the refrigeration theory as applied to the practical uses and applications. An indispensable reference for the student engineer and practical man.

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Gerhard J. Kopmeier

THE death of Gerhard J. Kopmeier, retired treasurer of the Wisconsin Ice & Coal Co., Milwaukee, Wis., occurred Friday, May 27, at St. Marys Hospital, Milwaukee, after an illness of two weeks. He was 88 years of age.

Mr. Kopmeier's father, John, founded the old Kopmeier Ice and Cartage Co. in 1849 and early this year, the company celebrated its 100th anniversary. It was the first ice company in Milwaukee. When he was 14 years old, Mr. Kopmeier began working for his father. Later, 1782, he and a brother, John, took over the business and at that time the name of the company was changed to the Wisconsin Ice & Coal Co. Mr. Kopmeier was its treasurer until his retirement in 1926.

He was a life member of the Elks Club, and a member of the Old Settlers Club and the Holy Name Society of St. Roberts Church. He observed his 60th wedding anniversary with his wife, Barbara, in 1943. She died in 1944.

Surviving are four daughters, Miss Eleanor Kopmeier, Mrs. Frank Gross, Jr., Mrs. Walter Heisler and Mrs. Russe F. Taylor, and a son, Gerhard D., all of Milwaukee.

NEW AND IMPROVED EQUIPMENT

MACHINERY-APPLIANCES-PROCESSES

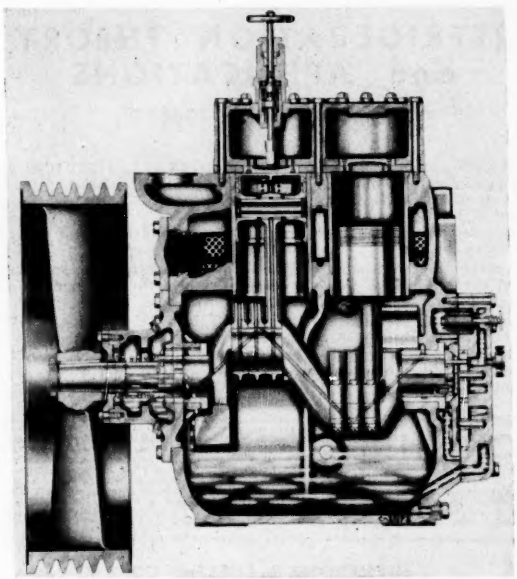
Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

New Vertical Ammonia Booster Compressors

THE production of a new line of vertical Ammonia Booster Compressors, designed for plants which handle a low-temperature load as well as a relatively high-temperature load, has been announced by Worthington Pump & Machinery Corp. Compressors are used by the food industries for the storage, freezing, and processing of various food products, and can be applied with equal success in both new and already installed refrigeration systems.

The Worthington Ammonia Booster is available in four sizes, with horse power ratings from 5 to 50, and capacity from 58 to 378 cfm actual gas displacement. Adequate forced-feed lubrication is provided by the use of a completely self-contained gear-type oil pump driven direct from the crankcase.

Further information may be obtained by writing for illustrated bulletin C-1100-B34; Worthington Pump & Machinery Corp., Harrison, N. J.



Longitudinal section through 6-cylinder Worthington booster compressor.

New Ice Plant Paints

THE Chemical Solvent Company, Birmingham, Ala., was originally organized to serve ice manufacturers in an advisory capacity, making tests and analyses to arrive at the correct solutions of their problems. When an ice plant wanted to know what to use to purify the water or otherwise improve the quality of its product, CSCO advised what treatment to use, where to secure materials, what proportions to use. Likewise, The Chemical Solvent Co. recommended the proper steps to take to remove incrustation and algae from compressor water jackets, condenser tubes, circulation systems and internal combustion engine cooling systems, and gave expert advice on many other problems the manufacturer faced.

But very few ice plants were adequately equipped to properly measure, mix and blend the compounds recommended or to otherwise take full advantage of the advice given, so there soon developed a demand upon CSCO to provide the compounds in their proper proportions to do the work for which each was recommended.

As a result the company evolved into a manufacturer of Distilex, Solvex, Aquatrol, Stableizers and Polarizers.

As CSCO developed their services for ice plants, the problem of destructive corrosion in cans, tanks, coils, condensers and other surfaces was receiving attention of the company chemists. As a consequence CC Coating was developed and numerous ice plants began using it. Being a phenolithic compound, it has an acute affinity for metal and forms a protective coating that is impervious to alkalis, acids and atmosphere. It is black, which is perfect for most surfaces upon which it is used, and forms a permanent coating for metal, wood and concrete surfaces exposed to atmosphere, water or brine. It can be used on the outside of ice cans as it will not insulate the cans and will not retard heat-transfer.

CC Coating is also being used on floors, walls and woodwork in stores and manufacturing plants where strong detergents have destroyed the paints and varnishes formerly used.

Profiting from experiences of the ancient's secrets of preservation, Frank Philabert, president of Chemical Solvent Co. developed an attractive grey paint which is particularly desirable for use on ice tank grids, grids, covers and lids as well as on floors and walls. Going directly to the soil which hid the secrets of our earliest known civilization, Mr. Philabert found the ingredients of the

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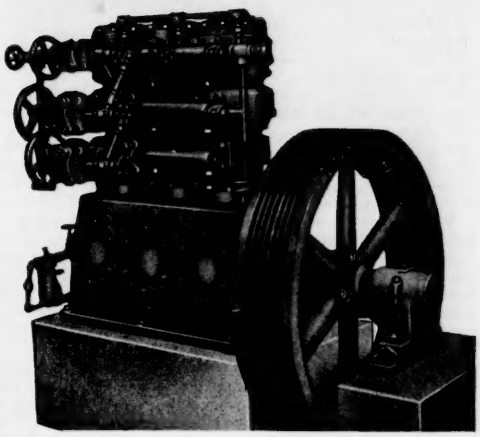

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paints which have survived the centuries, and is now using those identical ingredients in CSCO grey paint.

Both CC Coating and CSCO grey paint have given such satisfactory service that the Chemical Solvent Co. has increased production to meet increasing demands. Other colors of CC coating will be in production soon.

New Arc Welder for Light Gauge Welding

A SMALL low cost arc welder, operating off a 110 volt light circuit, yet having design and operating characteristics comparable to larger industrial welders, is now available for repairing and fabricating in light gauge metals. The Lincoln Electric Co. of Cleveland, Ohio, is announcing the production of the "Lincwelder 60" for use in body repair shops, bicycle, radio, refrigerator repair shops, motor repair shops and for use by plumbers, millrights, heating, electrical and sheet metal contractors.

With a maximum output of 60 amperes, it can be used for a variety of light gauge metal working jobs, as well as for joining heavier material such as strap, pipe tubing, angle and other shapes. The unit may also be used for cutting metals, soldering and making wire connections, brazing, heating for bending and, with a small rectifier, for battery charging. For repairs and fabricating in sheet metal it offers a method of welding, soldering and brazing that is faster, easier and better than conventional methods. according to the manufacturers.

It is available through Lincoln dealers and is sold complete with 6-ft. insulated cord and standard plug for conventional 110 volt light socket, protective welding head shield and lens, electrode holder and 9-ft. cable, ground cable, a supply of electrode and brazing rod.

New Filling Equipment for Santocel Insulation

NEW, labor-saving filling equipment for handling Monsanto Chemical Company's Santocel insulation has been developed by the company's Merrimac Division engineers, it was announced recently. The new apparatus, simply designed to meet easy installation requirements, has been demonstrated for refrigerator and freezer manufacturers at Merrimac Division manufacturing headquarters in Everett, Mass. Engineering and management representatives of leading companies watched as the new equipment was put into operation filling a four-cubic-foot freezer.

Wall thickness of the freezer had been reduced from four inches to two inches, increasing capacity to seven cubic feet. The cabinet was mounted at a double 45-degree angle on the platform of a hydraulic jolter. A clamp attached to the cabinet held the air-operated valve to an opening high on the back wall of the freezer.

A conical hood top was fitted over a standard 25-pound carton of Santocel and the assembly inverted into the feed end of a bucket elevator. The elevator carried the Santocel to an elevation of about 10 feet where it was allowed to flow into an open top hopper.

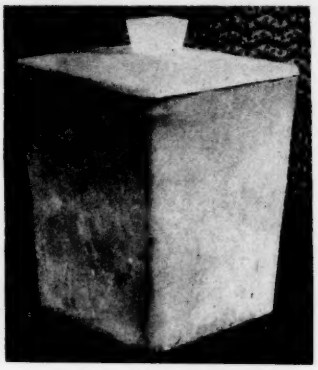
As the Santocel flowed into the freezer unit, the jolter cycled at a rate of 100 per minute with a travel of one inch. When half full, the cabinet was put under slight pressure, bulging the sides and allowing the Santocel to settle. This procedure was repeated two or three times until the cabinet was filled.

F. Faxon Ogden, Santocel sales manager, explained that artificial distention of the walls by air pressure reduced settling to a minimum and also exerted a packing effect on the Santocel.

Lincwelder 60 and accessories for welding, soldering and brazing light gauge metals

New Sponge Rubber Ice Bucket

A NEW sponge rubber bucket designed specifically for holding ice cubes is offered by the B & R Mfg. Corp., New York City. The



New B & B Ice Bucket

bucket is constructed entirely of sponge rubber which is not only a good insulating material, but will also withstand rough usage. It could, according to the circular issued by the company, be dropped from the top of the Empire State building and be in perfect condition for use afterward. The manufacturers claim that it will hold ice cubes for over 18 hours and that the rubber composition is completely non-toxic. Other features are that it is non-sweating and is flexible for pouring and squeezing.

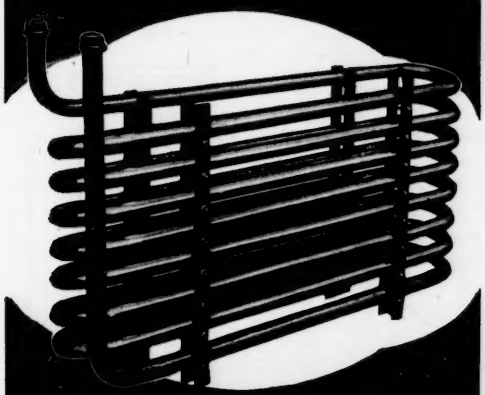
Spray Compound For Roofs

DEVELOPMENT of a durable, flexible, seamless metallic shield which can be sprayed onto asphalt or composition roofs to give them a more durable finish is announced by the Grems Manufacturing Co., Klamath Falls, Ore. The substance which is known as "Permalume" dries into a coating that is relatively thick and will expand or contract without cracking, according to the manufacturer. It can also be used for other purposes where a waterproof, light and heat reflecting, more fire resistant and weather resistant coating of low initial cost is desirable, over brick, concrete, metal, wood and other surfaces. It is applied by brush or spray much as heavy paint would be applied. Besides forming a protective coating for roofs, it is useful also to lighten plant interiors.

The new composition is formed by combining aluminum or copper with natural hydrocarbon compositions and fluxed with a softer, specially processed material and mixed to a very heavy paste which is cut to a consistency resembling that of quicksilver.

Coils

Smooth Bends
Perfect Welds
Exact Measurements



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BARRETT Standard Anhydrous Ammonia has a higher refrigerating effect, per unit liquid volume, than any other type of refrigerant. This means *more* refrigeration per pound of refrigerant used.

Other advantages of using Anhydrous Ammonia are: low initial cost, low power consumption, low friction losses and low vapor density.

These characteristics, together with consistent purity, and uniform quality, have made Barrett Standard Anhydrous Ammonia the outstanding choice of refrigerating engineers since 1890.

Barrett Standard Anhydrous Ammonia —the reliable, dependable, all-purpose refrigerant—is available in 150, 100 and 50-pound cylinders for *speedy delivery* from stock points conveniently located from coast to coast.

Barrett STANDARD ANHYDROUS AMMONIA

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ALLIED CHEMICAL & DYE CORPORATION
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4528 South Broadway, St. Louis 11, Mo.

Barrett

New Finish for Corkboard

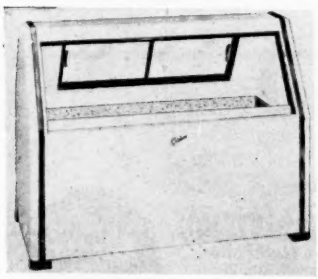
A NEW material which can be used as either an adhesive or finish for corkboard or cork covering to prevent damage to the insulation from solvent products has been developed by the Armstrong Cork Co.

The new product, called Solvopruf, is a self-curing compound which may be applied by brush or trowel. It sets to a rubber-like film at room temperature and remains in this condition when exposed to temperatures ranging from -35 F. to plus 125 F. Upon aging six or seven days, Solvopruf is resistant to the action of toluol, methyl ethyl ketone, gasoline, kerosene, and water. Although benzol causes Solvopruf to swell, the protective film remains in a serviceable condition.

Solvopruf is manufactured for shipment immediately prior to application. It is not to be stored. It is recommended for use only with corkboard or uncoated cork covering since the solvent in the material will soften asphalt products. It is mixed for application on the job. The mix will remain in a fluid condition at normal temperatures for approximately two hours and must be used within this period. The new compound has been used successfully for several years. Installations where it has proved satisfactory include oil refineries.

New Display Case For Crushed Ice

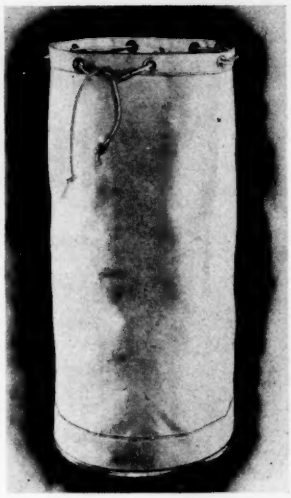
A CRUSHED ice case for displaying fish, vegetables, dairy products, flowers and other perishable goods directly on crushed ice is announced by the Ice Cooling Appliance Corp., Morrison, Ill. The glass front is made of one thickness of plate glass set in live rubber with two glass sliding service doors set in chrome steel frame at the back. The crushed ice compartment is made of 16 gauge galvanized steel with 3 in. laminated insulation in the bottom and 2 in. in the wall. An open compartment is provided at the rear for dry storage. The case is equipped for fluorescent lighting.



New Ice Cooling Appliance Corp. Display Case

New Containers for Ice

A NEW line of baskets, trunks and bags for handling food products and ice is announced by C. R. Daniels, Inc., Daniels, Md. They are made from Sanitex, a vinyl impregnated canvas, available in standard silver color and other colors upon request.



Daniels Ice Bag Made of Sanitex

The versatility and wearability of these new containers are economy factors aimed at maximum service and convenience. They are washable, long wearing, oil and grease repellant, will take up to 300 F. heat without damage and will not shrink, according to the manufacturers.

New Gasoline Operated Trucloader

A NUMBER of chassis improvements feature the redesigned Clark "Trucloader," gasoline operated fork-lift truck of 1000 lbs. capacity, according to a bulletin issued by J. H. W. Conklin, sales manager, Industrial Truck Division of Clark Equipment Company. In outward appearance the new Trucloader resembles the design of Clark's new Carloader model. The gas tank is attached to the rear of the frame and is partially enclosed by the counterweight. The counterweight has been redesigned to more rounded contour, and additional weight provides added stability. The steering column has been moved forward to provide more leg room; and lift and tilt levers have been relocated in the same positions as on other Clark models. Floor plates can be easily removed and replaced; and hinged louvers on either side of the engine compartment make for improved accessibility.

New Gasoline Operated Clark "Trucloader"

New Self-Contained Air Recovery Unit

THE development of a new, self-contained cell-type unit for air conditioning and ventilating systems is announced by W. B. Connor Engineering Corp., manufacturers of activated carbon air recovery equipment. With a capacity of 1000 cu. ft. of air per minute, this unit, known as the Type "C" Cell, has overall dimensions of 24x24x8¾ in. deep, low air flow resistance, and has been designed to provide a simple, effective air purification device that can be easily installed and serviced. The Type "C" Cell may be installed in multiple, in either flat of "V" arrangement. For abnormal odor concentrations two cells in series per 1000 CFM are recommended.

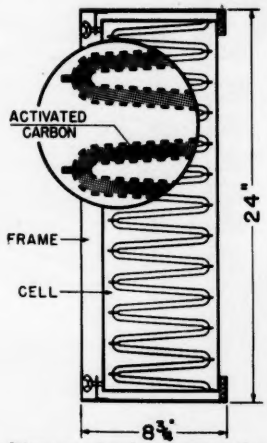


Diagram showing construction details of Type "C" Cell Unit for air conditioning.

Complete details and specifications are contained in Dorex Bulletin 117-B which may be obtained by writing W. B. Connor Engineering Corp., 112 East 32nd St., New York 16, N. Y.

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ARMOUR'S ANHYDROUS AMMONIA

Armour's Anhydrous Ammonia is pure and dry . . . free of moisture and non-condensable gases. And to insure trouble-free operations, every cylinder is tested and checked before shipping to give positive assurance of fine quality.

Remember, too, that fast shipment is an Armour byword. In fact, many customers receive their Armour's Anhydrous Ammonia the day it is ordered. 65 conveniently-located stock points are your assurance of receiving prompt shipment of Armour's Anhydrous Ammonia in either 50, 100 or 150 pound cylinders where you want it, when you want it and fast.

Please return empty cylinders!

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2½ x 5 in. 144 Pages

A book of convenient size to carry in the vest pocket, so the engineer can have his practical memoranda at hand at all times.

"Refrigeration Memoranda" contains a number of useful memoranda and tables in plain everyday engine room language and in plain figures.

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The rules and tables for obtaining the size of compressors required for different duties, and for the amount of pipe for condensers and storage rooms, will be valuable to parties intending to purchase refrigerating or ice making plant, and to engineers expecting to take charge of or install new plants. **$1.00**

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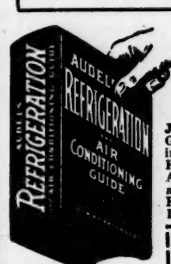

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New Paper Bag is Water Repellant

DEVELOPMENT of a new type water repellant paper bag for the packaging, delivery and storage of crushed and cubed ice for restaurants, bars and markets has been announced by Union Bag & Paper Corp. The new bag is water repellant for from 24 to 72 hours, much longer than any other moisture resistant container previously marketed.

Union Bag's previous containers for processed ice were made of wet strength paper which simply is a sheet that remains strong even when wet, but does not resist water penetration. The new water repellant feature makes the paper actually stronger by lowering the water absorbancy of the sheet and consequent water penetration.

The new bags are designed for packaging and shipping all products with a high moisture content. They are wire tied thus protecting contents from soilage. They are now being manufactured for commercial purposes.

MANUFACTURERS' NEWS

Binks Advances Roches Father and Son

DIRECTORS of the Binks Manufacturing Co., at their annual meeting in the offices of the company at 3114-40 Carroll Ave., Chicago, on April 26, elected President J. F. Roche as Chairman of the Board. He is succeeded in the presidency by his son, Burke B. Roche.

J. F. Roche

Burke B. Roche

The Binks company is widely known for its industrial spray painting equipment, industrial cooling towers, nozzles, and other large installations in these fields. The organization was founded more than half a century ago by the late Joseph Binks, who perfected the first successful paint spray gun and other widely used inventions. In 1928, Mr. Roche was made executive vice president. He has served as president of the company since 1936.

Burke B. Roche, who succeeds to the Binks presidency, was elected vice-president in 1948 and has been in charge of the company's industrial division. After graduating from Loyola University, he attended Northwestern and De Paul Law Schools, was admitted to the Illinois Bar in 1939 and, the same year, entered upon his business career with the Binks Company. He later graduated from the Naval Ordnance School at the Naval Gun Factory, in Washington, D. C., and served as a Naval Ordnance Officer in the Pacific theatre of operations during the war.

Worthington Elects Marshall Secretary

AT A MEETING of the Board of Directors of Worthington Pump and Machinery Corp. held May 18, Robert E. Marshall was elected Secretary of the Corporation, succeeding the late C. Neal Barney. Mr. Marshall has been associated with the corporation since 1947, serving as a member of the Legal Department, Counselor on Industrial Relations, and Assistant Secretary. His headquarters will be at the corporation's New York offices at 2 Park Avenue.

Robert E. Marshall

Correction

THE heading of an announcement in the June issue incorrectly stated that the York Corp. will manufacture Recold Coils. It should have stated that under the terms of a license agreement between York and Refrigeration Engineering Inc., of Los Angeles, York will manufacture certain refrigeration coils using the water defrost method which was developed and patented by Recold.

Acme Industries Announces New Personnel

ADDITIONS of new personnel have been announced by Acme Industries, Jackson, Mich.

Robert T. Jones has been appointed as the new manager of design and development. Mr. Jones formerly was with Chrysler Corp., Airtemp Division, Dayton, Ohio for four years as supervisor of design and development. He has also been associated with York Corp. and is familiar with the application, engineering laboratory and field research.

Robert J. Jones

Charles King Carter

Roy C. Yantis

Charles King Carter has been appointed sales engineer. Mr. Carter has long been associated with the refrigeration and air conditioning industries, coming to Acme from Universal Cooler. He was previously with Minneapolis Honeywell and Westinghouse. He is a graduate of Carnegie Tech. and is a member of the American Society of Refrigerating Engineers.

Roy C. Yantis joins Acme as a regional sales director. Mr. Yantis was formerly sales manager for the Henry Valve Co. of Chicago. He is an Ohio State University Alumnus and is an experienced refrigeration man, and was formerly with Gibson Refrigeration and Frigidaire. He will cover the Eastern States contacting and assisting dealers, distributors, engineers, architects, jobbers, on the selection and application of Acme products.

CSCO Appoints Voter

THE Chemical Solvent Company, Birmingham, Ala., has appointed G. H. Voter Company, 310 Congress Street, Boston, Mass., as their sales and service representative in New England. The Voter Company will cover all of New England with the exception of that part of Connecticut and Massachusetts which lies West of the Connecticut River.

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Electrically welded, continuous; Air-Pressure-Tested while submerged in water. Built to your specifications. Send for new Coil Data Book and let us quote.

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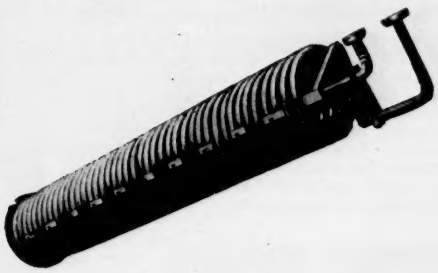

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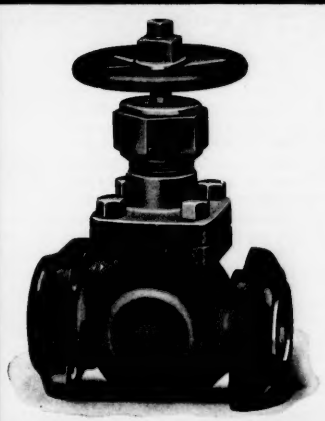

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- **AMMONIA VALVES**
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  For ammonia and Freon in all sizes from ¾" to 6"
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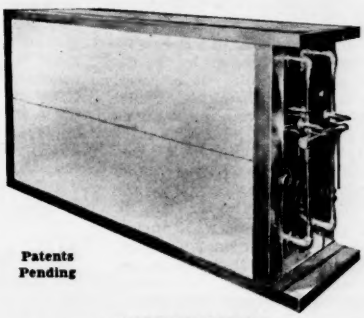

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- **Equipped with "E" type permanently fixed louvres.**
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Write for Bulletin No. 95

THE KING ZEERO COMPANY
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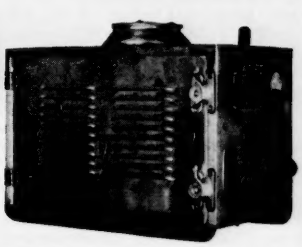

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Let General Ozone engineers solve your odor and mold problems. General Ozone has a complete line of modern ozonizing equipment plus full service facilities for both old and new types. Write us today for further information.

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Approved by Underwriters' Laboratories, Inc.

Manufacturers of ozone generating equipment for cold-storage • warehouses refrigerated cars • walk-in coolers • air recirculating systems • homes • garages • hospitals

Mathieson Announces New Sales Personnel

AS A RESULT of the retirement of E. E. Routh, vice-president, director of sales, Mathieson Chemical Corp. announces changes in its sales department executive staff. D. W. Drummond has been named vice-president, director of industrial chemical sales and S. L. Nevins has been named vice-president, director of agricultural chemical sales.

D. W. Drummond

E. E. Routh

All heavy chemicals including sulfuric acid will be handled by the industrial chemical sales department. All agricultural chemicals which have been added as the result of recent acquisitions of Southern Acid & Sulphur Co. and Standard Wholesale Phosphate & Acid Works, Inc., will be under the direction of the agricultural chemical sales department.

Other appointments are as follows: J. O. Logan becomes sales manager, industrial chemicals; R. J. Quinn, assistant sales manager, industrial chemicals; L. P. Thomas, southwestern sales manager, industrial chemicals; J. S. Whittington, sales manager, agricultural chemicals. Mr. Thomas will be in Houston, Texas, and Mr. Quinn and Mr. Whittington will be in Baltimore, Md. All others will be located in Mathieson's executive offices.

Canadian Ice Machine Report

THE annual report of Canadian Ice Machine Co., Ltd., Montreal, Canada, for the year ended December 31, 1948, shows net profit of $92,275, equal to $1.34 a share of common, compared with $77,684, or $1.05 a share in 1947. President H. V. Shipley said higher inventories reflect price increases and heavier stocks. Inventories stood at $490,124 against $421,703. Working capital position improved and was $494,350 against $403,076 at the previous year-end. Earnings on the common are after aggregate of $1 per share on the class A, set aside to cover preference and participating rights on the "A" shares. Mr. Shipley stated that with the exception of the shortage of pipe, stocks are in better balance than they have been in recent years.

Link Belt Moves Riley to Newark

THE Newark, N. J., office of the Link-Belt Co. has expanded its forces and moved to larger, more convenient quarters at 212 Essex Bldg., 31 Clinton St.

John D. Riley

As district manager at Newark, John D. Riley has been named to succeed George E. Ramsden who died April 10. Mr. Riley has had wide experience in the application of Link-Belt products, having entered the employ of the company's Philadelphia plant in 1934, where he successively served the shovel and crane, retail store and general sales departments. Since 1939 he has been district sales engineer at the company's Boston office, serving customers throughout the states of Maine, New Hampshire and northeastern Massachusetts.

Mooney Joins Carrier as Zone Manager

THE appointment of Mark E. Mooney as zone manager for commercial refrigeration and food freezers for Carrier Corp., covering the eastern seaboard states from Virginia to Maine, has been announced by C. U. Spriggs, Assistant General Sales Manager.

Mark E. Mooney

Carrier plans to expand its commercial refrigeration marketing activities to keep pace with the growth of the air conditioning end of the business, and the current appointment is part of this program, Mr. Spriggs said.

Mr. Mooney is a veteran in the refrigeration field. He is chairman of the Joint Industry Engineering Committee of the Refrigeration Equipment Manufacturers Association and the Air Conditioning and Refrigeration Manufacturers Association, and also is chairman of the small compressor section of ACRMA. A graduate of Notre Dame University, he also is a past chairman of the Central New York Section of the A.S.R.E.

Previously a product manager for Carrier's commercial refrigeration line, Mr. Mooney will concentrate entirely on developing key eastern markets not only for this line but also for Carrier's newly designed 15 and 30 cubic foot food freezers. He will work out of both New York and Philadelphia in covering New York State and Pennsylvania, New England, New Jersey, Delaware, Maryland and Virginia.

Vilter Elects Vogel Vice-president

THE election of A. O. Vogel as a Vice-president of the Vilter Manufacturing Co., Milwaukee, Wis., has been announced by E. B. Tilton, president. Mr. Vogel is a graduate of Cornell University, School of Engineering. He has been associated with The Vilter Manufacturing Co. in various capacities for the past twenty-six years, with the exception of the war years. He holds the rank of Lieutenant Commander in the United States Naval Reserve. He is a member of the Milwaukee Yacht Club, the University Club, a director of the Milwaukee Zoological Society and a director of the Air Conditioning and Refrigerating Machinery Association, and a member of the American Society of Refrigerating Engineers. His duties will be to supervise the home office sales department, branch sales offices, and the sales relations and transactions between the company, its distributors and customers.

Water Defrost License Issued to Worthington

A LICENSE has been issued by Refrigeration Engineering, Inc., to the Worthington Pump & Machinery Corp. of Harrison, N. J., to use the water defrost method in refrigeration production, according to an announcement by Hy Jarvis, vice-president and general manager of Recold.

The development of the water defrost method of refrigeration was undertaken by Recold in 1938 and a patent covering it was issued in 1940. Since that time many installations of this equipment have been made in every type of low temperature application. The license just issued to Worthington makes a total of thirteen manufacturers who are now using the water defrost method under a license agreement with Recold.

REMPE PRODUCTS are QUALITY! That's what you want.

Quality-Built Heat Transfer Equipment . . . less service . . . longer life . . . greater efficiency. Rempe Products have proved their exceptional value for over 50 years.

PIPE COILS

Coils, Bends, Tank and Coil Assemblies for Ice and Refrigeration Plants, Cold Storage Houses, all types of industry—all purposes.

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OVERHEAD BLOWER UNITS

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You cannot buy better quality and assured performance than that which is built into Rempe Unit Coolers. Use them for Produce Cooling and Freezer Rooms.

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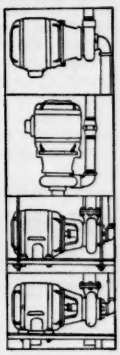
READILY INSTALLED ANY POSITION



Type GMC AURORA CENTRIFUGAL CLOSE-COUPLED PUMPS

These Close-Coupled Pumps "by Aurora" are ideal for a multitude of applications, particularly where the saving of space is important, or location is unconventional. Operate smoothly in any position. Sturdy bracket insures permanent pump-motor alignment. Ready access to glands—extra deep stuffing box, hydraulically balanced. High quality throughout. Available for screwed or flanged connections. Require small amount of metal for handling corrosives.

APCO TURBINE-TYPE PUMPS Here's the Pump for "1001" duties. SIMPLE—only one moving part, the impeller. Capacities to 150 G.P.M. Heads to 600 ft. Slight change in capacity against drastic head variations.

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HEAD BACK PRESSURE CALCULATOR

Actual Size 3½ in. square

Price $1.00

The Head-Back Pressure Calculator quickly determines the proper head pressure, for various refrigerants when the suction pressure, room temperature or mean water temperature is known.

A number of troubles can be detected by comparison of the existing head pressure with what the head pressure should be, but in the past there has been no convenient method available to the engineer to determine what this should be. Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all enter in determining the proper head pressure.

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LITTLE GIANT ICE BREAKERS

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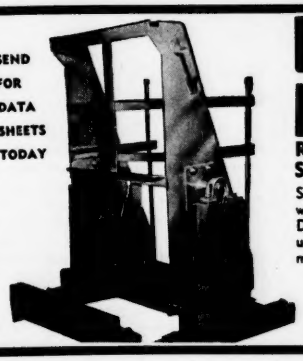

ICE CAN DUMPERS

Rugged Construction—Smoother Operation

Save time . . . save labor . . . save money with skillfully designed RECO Ice Can Dumpers. Engineered for years of hard usage. Easy to operate all parts carry manufacturers one year warranty.

Complete Ice Plant Components Catalog Available

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- BRINE COOLERS
- RACEWAY COILS
- EVAPORATIVE CONDENSERS
- COOLING TOWERS
- AIR AGITATION EQUIPMENT
- ICE HANDLING EQUIPMENT
- GAUGES AND THERMOMETERS
- ICE CRUSHERS
- GENERAL ICE SUPPLIES

(REFRIGERATION ENGINEERING CORP.)
RECO PRODUCTS DIVISION
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Clark Equipment Appoints Dealers

FORK-LIFT trucks, industrial towing tractors and handling attachments manufactured by the Clark Equipment Co. are to be sold exclusively through a nation-wide organization of independent franchised dealers, effective immediately, according to announcement by George Spatta, president of the company. In most instances, key men of the former branch organizations, factory-trained by Clark and thoroughly experienced in familiar sales territories, have been franchised as dealers, or have been selected as partners in the newly-established dealerships.

Through the dealers, the users of Clark machines will have immediate access to Clark's long experience in materials handling, and to the counsel of Clark engineers for solution of difficult handling problems. Also, an important practical benefit to Clark owners is the nearness of adequate service facilities and stocks of service parts, Mr. Spatta declared. These fork-lift trucks and attachments are products of the Industrial Truck Division of The Clark Equipment Co.

CATALOGS AND BULLETINS

Handbook on Aluminum Structural Design

A NEW 124-page handbook "Aluminum Structural Design" on how to design load-carrying aluminum structures has been issued by Reynolds Metal Co., Louisville, Ky. The purpose of the book is to enable the engineer familiar with mechanics of materials to design an original structure of aluminum, or to convert an existing structural design from some other material to aluminum. The discussion is broken down into chapters on figuring tensile stresses, compressive stresses, bending stresses, and shear stresses, as well as stresses in cylinders subjected to fluid pressure.

Formulas and actual examples contribute to usefulness of the book. A section is devoted to fabricating considerations and joining methods, including riveting, bolting, fusion welding, and spot welding. Additional chapters cover deflection and vibration problems.

The book will be sent without charge to designers, engineers, architects and other company officials who request it on their company letterhead. Address request to Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

Marlo Announces New Steam Coil Catalog

A NEW 36-page catalog covering the complete line of steam coils has been prepared by Marlo Coil Co. of St. Louis, manufacturers of ball-bonded heating and cooling coils and heat transfer equipment.

Designed for quick reference and use, the new Marlo catalog contains illustrations of the Marlo standard steam coils and standard non-freeze steam coils, with factual, simplified descriptions, including easy-to-use dimensional data, capacity ratings and coil selection charts. Supplemental information on steam properties, condensation rate factors, air friction and steam coil weights make the catalog a complete working and estimating guide for heat transfer installation, service and maintenance engineers.

Copies of the new catalog may be obtained by writing to the Marlo Coil Co., 6135 Manchester Avenue, St. Louis 10, Mo.

Bulletin on Steel Purger

A BULLETIN on forged steel purgers has been issusd by the Armstrong Machine Works, Three Rivers, Mich. It tells the benefits of this device, pointing them out as follows: reduces head pressure, saves power, refrigerant and work, increases capacity and keeps refrigeration systems free of non-condensable gases. The bulletin is illustrated with charts, pictures and diagrams. Installation details, specifications and prices are included and messages from users testify as to their usefulness. A copy of the bulletin will be sent upon request to The Armstrong Machine Works.

New Ammonia Condenser Catalog

A NEW catalog on ammonia condensers, No. 21-C has been released by Acme Industries, Inc., Jackson, Mich. This catalog presents an illustrated description of construction details of shell and tube condensers, also a chart and table showing typical water connections, dimensions of horizontal ammonia condensers, and other charts, tables and illustrations. Copies are available from the Acme factory at Jackson, Mich. or any Acme representative.

MARTOCELLO ICE PICKS

"Cost You Less To Buy The Best"

Immediate Delivery on Plain Handle Ice Picks

BLADES

of High Carbon Tool Steel, accurately tempered to give you maximum use.

HANDLES

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of Pressed Steel securely registered on Handle and Plated to Resist Corrosion.

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Jos. A. Martocello & Co. 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

Serving the Ice Industry Since 1916 "There is no Substitute for MARTOCELLO QUALITY"

R-175 GD—Illustrated Deluxe Streamlined Cabinet, Front Glass Filler Faucet, Pressure Water Cooler. Natural satin aluminum finish. Heavy cast aluminum top, with bright chrome-like finish. 45 ft. copper coil; 75 lb. ice capacity.

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ICE WATER COOLERS ARE AVAILABLE IN 9 MODELS TO SERVE ANY DRINKING WATER NEED

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WON'T RUST OR CORRODE

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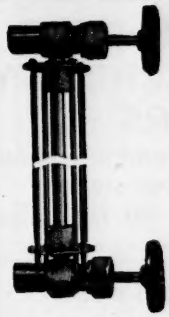

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All-Steel construction. Automatic shut off of liquid in case of glass breakage. Composition packing rings give long life, no-leak seal.

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Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem—Shank design base—perfect alignment. Long life packing ring.

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Nationally Known for the Best

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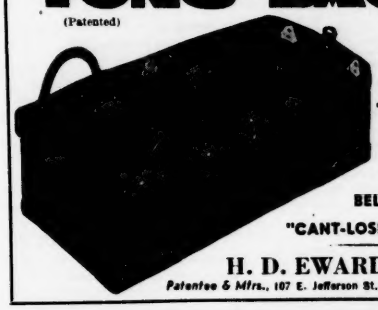

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Only the Highest Quality Merchandise and efficient service necessary for the proper and profitable operation of your business. Write for our 1949 catalog.

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ICE TOOLS AND SUPPLIES

WE CONTINUE YEAR AFTER YEAR
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TANK TOPS • LIDS WALLS • MACHINERY FLOORS

AND OTHER SURFACES . . . KEEP THEM CLEANER

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When Properly Painted! CSCO GREY PAINT Is Made Especially For Ice Plant Service!

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★ **NO WET CEILINGS**
★ **NO FROST ON COILS**
★ **NO ODORS**
★ **NO FLAVOR TRANSFERENCE**

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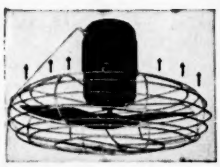

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It Blows Upward

Here's a simple and inexpensive way of keeping refrigerated storage rooms in a dry, sanitary condition.

No complicated or expensive blowers, ducts, diffusers, etc. required.

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Write for Bulletin 241 giving typical installations, flow charts, data tables, etc.

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Vogt Machine Co., Henry, Louisville, Ky.

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Refrigeration Engineering Corp., Philadelphia, Pa.

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Reynolds Electric Co., River Grove, Ill.

AIR COMPRESSORS
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Frick Co., Waynesboro, Pa.
Worthington Pump and Machinery Corp., Harrison, N. J.

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Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Niagara Blower Co., New York, N.Y.

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Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., Ridgefield Park, N. J.
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Vogt Machine Co., Henry, Louisville, Ky.

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Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Roots-Connersville Blower Corp., Connersville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.

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Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry,
Louisville, Ky.

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Martocello & Co., Jos. A.,
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Solvay Sales Div., Allied Chemical &
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(See Dumps, Can)

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Chicago, Ill.
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Pittsburg Pipe Coil & Bending Co.,
Pittsburg, Pa.

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Refrigeration Engineering Corp.,
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Louisville, Ky.

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Jamison Cold Stge. Door Co.,
Hagerstown, Md.
Refrigeration Engineering Co.,
Minneapolis, Minn.

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(See Ice Making and
refrigerating Machinery)
(See Air Compressors)

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Baker Refrigeration Corp.
So. Windham, Maine
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Chicago, Ill.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc. R. P.,
Ridgefield Park, N. J.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co.,
New Haven, Conn.
Philadelphia Pipe Bending Co.,
Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co.,
Pittsburgh, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry,
Louisville, Ky.

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Refrigeration Engineering Corp.,
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Vogt Machine Co., Henry,
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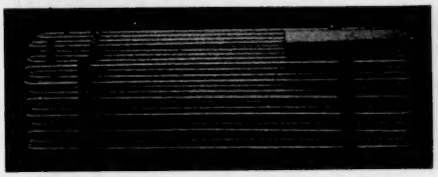
Whether your next job be for a single bend, or coil or complete piping system, Chicago Nipple can supply your requirements. Experienced workmen, practical engineers, and modern equipment reflect the quality of our products.



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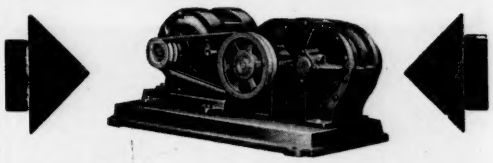

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Neither clock nor calendar means a thing in the life of an R-C Rotary Positive Blower. They're built to take years of ice-making service with never a falter or a let-down. That's because they're simple and sturdy for long-time, continuous operation. If you want to make sure of your air supply, install Roots-Connersville Blowers, backed by almost a century of air-handling experience. Send for details in Bulletin R-5341.

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One of the Dresser Industries

ROOTS-CONNERSVILLE BLOWER BUILDERS SINCE 1854

Deliver SIZED ICE in Style!

Stag Brand

KORO SEAL
TREATED CANVAS
AND
NO-FADE GREEN
TREATED CANVAS
ICE BAGS

ATTRACTIVE... HUSKY... Sanitary containers.

BUILD MORE BUSINESS! Lower your costs, too, with "STAG BRAND" Metal Bottom Ice Bags. They are "tops" from any angle.

Write for Illustrated Price List
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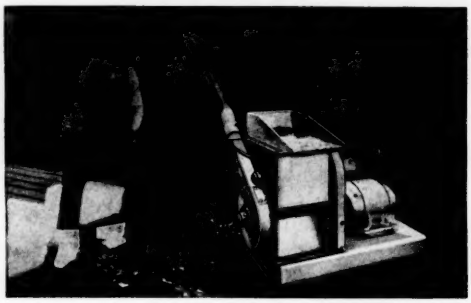

An ice business builder that benefits everybody

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Snow-ice is produced by the Link-Belt Ice Crusher-Slinger, available in a number of sizes and styles. For details ask for Book No. 2261.

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1062

LINK-BELT ICE CRUSHER-SLINGER

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Lilly Co., The, Memphis, Tenn.
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Vogt Machine Co., Henry, Louisville, Ky.

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Martocello & Co., Jos. A., Philadelphia, Pa.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Refrigeration Engineering Corp., Philadelphia, Pa.

ICE CHIPPERS
Gifford-Wood Co., Hudson, N. Y.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Co., Minneapolis, Minn.
Refrigeration Engineering Corp., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CHUTES
Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Jamison Cold Storage Door Co., Hagerstown, Md.
Link-Belt Co., Chicago, Ill.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Corp., Philadelphia, Pa.

ICE CONVEYORS
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.
Refrigeration Engineering Co., Minneapolis, Minn.
United Ice Supply Co., Boston, Mass.

ICE CREAM PLANTS
Baker Refrigeration Corp. So. Windham, Maine
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

ICE CRUSHERS
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Gifford-Wood Co., Hudson, N. Y.

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Link-Belt Co., Chicago, Ill.
Martocello & Co., Jos. A., Philadelphia, Pa.
Micron, Inc., Bettendorf, Iowa
Refrigeration Engineering Corp., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBE CONTAINERS
Lilly Co., The, Memphis, Tenn.
Pittsburgh Waterproof Co., Pittsburgh, Pa.
Union Bag & Paper Co., New York, N. Y.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBERS
Flynn & Emrich Co., Baltimore, Md.
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Martocello & Co., Jos. A., Philadelphia, Pa.
Pace Brothers, Los Angeles, Calif.
Refrigeration Engineering Corp., Philadelphia, Pa.
Thermo Cuber Co., Chicago, Ill.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE CUBING MACHINES
Flynn & Emrich Co., Baltimore, Md.
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Lilly Co., The, Memphis, Tenn.
Pace Brothers, Los Angeles, Calif.
Thermo Cuber Co., Chicago, Ill.
United Ice Supply Co., Boston, Mass.

ICE DELIVERY BAGS
Eward Co., H. D., Ft. Wayne, Ind.
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Martocello & Co., Jos. A., Philadelphia, Pa.
Pittsburgh Waterproof Co., Pittsburgh, Pa.
Union Bag & Paper Corp., New York, N. Y.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE ELEVATORS AND CONVEYORS
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Link-Belt Co., Chicago, Ill.

ICE HARVESTING MACHINERY & TOOLS
Gifford-Wood Co., Hudson, N. Y.
United Ice Supply Co., Boston, Mass.

ICE MAKING AND REFRIGERATING MACHINERY
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Creamery Package Mfg. Co., Chicago, Il.
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Howe Ice Machine Co., Chicago, Ill.
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Reynolds Mfg. Co., Springfield, Mo.
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ICE PICK SCABBARDS
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Martocello & Co., Jos. A., Philadelphia, Pa.
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Vivian Mfg. Co., St. Louis, Mo.

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Martocello & Co., Jos. A., Philadelphia, Pa.
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Vivian Mfg. Co., St. Louis, Mo.

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Frick Company, Waynesboro, Pa.
Jamison Cold Storage Door Co., Hagerstown, Md.
Refrigeration Engineering Co. Minneapolis, Minn.
S & S Vending Machine Co., San Jose, Calif.
Thermo Cuber Co., Chicago, Ill.

ICED DISPLAY CASES
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ICED WATER COOLERS
Sanitary Equipment Mfg. Co., Inc., St. Louis, Mo.

INSTANTANEOUS HEATERS
National Pipe Bending Co., New Haven, Conn.

INSULATING MATERIALS
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Pacific Lumber Co., San Francisco, Calif.
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Ohio Galvanizing & Mfg. Co., Niles, Ohio
The Moto-Truc Co., Cleveland, Ohio

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BAKER
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In *Freon* compressor and condensing units from 1 to 60 H.P.

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THE BUYERS

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Socony-Vacuum Oil Co., Inc., New York, N. Y.
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Acme Industries, Inc., Jackson, Mich.
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King-Zeere Company, Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Vogt Machine Co., Henry, Louisville, Ky.

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Vivian Mfg. Co., St. Louis, Mo.

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SPRAY PONDS
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Frick Company, Waynesboro, Pa.
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Refrigeration Engineering Corp., Philadelphia, Pa.

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Mathieson Chemical Corp. New York, N. Y.

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Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Pittsburgh, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

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Layne & Bowler, Inc., Memphis, Tenn.

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Byers Co., A. M., Pittsburgh, Pa.

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Drum can be removed for installing teeth without dismantling machine. Has four operating adjustments on sizing grate that size ice from drug store to 1½ in.

Metal guard covers fly wheel, belt and motor pulley.

Legs are 24" high, allowing a 25-lb. paper bag to rest under crusher. Has spout for filling bags. Due to drum and pick design only a ¼ H.P. motor is required to operate crusher.

Pulley and belt furnished when machine is ordered without motor.

Crusher, complete with legs, less motor	$120.50
Galvanized	add 16.00
¼ H.P. single phase motor	25.00
½ H.P. single phase motor	35.00
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HOPPER OPENING TAKES A 25 LB. BLOCK OF ICE.

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for Ice, Cold Storage, Dairy, Ice Cream, Oil Refinery, Refrigerated Processing or Air Conditioning operations. Thorough knowledge and broad experience in design, erection and operation of refrigerating plants. Excellent references furnished on responsibility, character and ability. Address Box JL-7, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

ICE PLANTS—*Wanted and For Sale*

FOR SALE—Contract for twenty-two ton Frick ice plant, consisting of 256 cans, one 7x7 and one 5x5 compressor, evaporator condensor. To be delivered during November 1949. Manufacturers price; with my deposit payable now. Address Box JU-4, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Small ice plant in western Kansas, $10,000.00. Five thousand cash will handle. A good deal for a hustler. Address Box JL-10, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Ideal 20 ton electric ice plant, modern design, four years old; in noncompetitive S. C., town; reasonably priced; good terms. Selling capacity in rapidly expanding section of South Carolina. Immediate possession. Address Box JL-12, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE
Complete 90-ton ice-making plant, to be sold as a unit.
1307 ST. CLAIR AVE. DASCO CLEVELAND 14, OHIO

LIQUIDATING
LARGE ICE PLANT
4 Ingersoll-Rand ammonia compressors, 50, 90 & 100 tons, direct connected to synchronous motors. 1 York 6½ x 6½ h.s. V belt, forced feed lubrication. 1 York 6½ x 6½ slow speed. 3 transformers. 500 ice cans 300#. 2 large brine coolers. Electric cranes. 1000' - 2" ammonia pipe with return bends, like new. 4 high pressure boilers.
H. LOEB & SON
4643 Lancaster Ave. Philadelphia 31, Penna.

USED MACHINERY—*Wanted and For Sale*

FOR SALE—1 Link Belt whole cake ice slinger, equipped with 25 h.p. electric motor. In perfect condition. Price $1000.00 Copes Ice Co., Tasley, Virginia.

WANTED—In the market for any good used refrigerating and ice making equipment you may have for sale. Address Box DC-19, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—York compressors, 3x3 to 9x9, splash lubrication, also 3x3 and 4x4 self-contained units. One 40 ton Vogt, one 10 ton and one 15 ton Vilter shell and tube condensers. Ammonia valves 30% off. Write E. Niebling, 1318 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—New Frick 6"x6" and 4"x4", V-belt drive, 400 r.p.m. ammonia compressors; 5"x5" ammonia combined unit, all on original skids. Also 20"x10' Asme receiver, oil separator. Bargain! Jersey Ice Machine Co., 145 Jackson St., Newark 5, N. J. Mitchell 2-6439.

FOR SALE—On hand for immediate shipment, one brand new latest model 8"x8" Frick ammonia compressor with new 60 h.p., 1150 r.p.m. motor and V-belt drive. Priced right. Wire or write Box JL-3, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE
FRICK HORIZONTAL DOUBLE-ACTING AMMONIA COMPRESSOR AND CROSS-COMPOUND CORLISS STEAM ENGINE
Compressor: 2 cylinder, 15" bore by 30" stroke. Engine: one high pressure cylinder, 20" bore by 30" stroke; one low pressure cylinder, 42" bore by 30" stroke. Model: 16655. Capacity: 325 tons in 24 hours at 80 r.p.m. and 35 lbs. suction. Requires 250 h.p. boiler (not included). Condition is excellent, having been completely overhauled recently. Has been operated occasionally since overhaul, as a stand-in only. Included in sale price is the following equipment: 1 water pump, 1 steam condenser, 1 vacuum pump—all in first class condition. PRICE $10,000.00 as described and as located in our plant at Hawaii Brewing Corporation, Honolulu. Write or phone
CREAMERIES OF AMERICA, INC.
320 Roosevelt Bldg. Phone: Michigan 6041 Los Angeles 14, Calif.

USED MACHINERY—*Wanted and For Sale—Cont.*

FOR SALE
7½x7½ Creamery Package ammonia compressor, V-belt drive, 30 h.p. motor, complete with starting switches.
2 - 3x3 two cylinder York ammonia compressors.
Type 50 F & E safety cuber.
G-W ice scoring machine.
LUNNEY-CARSON COMPANY
2829 N. Broad St. Philadelphia 32, Penna.

FOR SALE—Complete 20 ton Arctic Pownall ice making plant with two compressors; 1 each York 9x9, Frick 6x6, York 5x5 self-contained unit, Baker 4½x5 self-contained unit. Lipman 4 ton self-contained unit. 1 ton York flake ice. 1 h.p. Frigidaire Freon unit. 1½x5" weld return bends. Frick 10x10 crank shafts and pistons. 1 each 150 and 180 h.p. Fairbanks-Morse Diesel engines; 1 each 40 and 60 KVA generators complete. Freezer doors, pipe coils, ammonia fittings. 1—15 h.p. DC G.E. motor. 1—25 h.p. G.E. motor. Parke Pettewgrew & Son Co., 370 West Broad St., Columbus 8, Ohio.

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FOR SALE—ICE PLANTS & EQUIPMENT
1—20 ton York ice plant electric driven.
1—30 ton York ice plant, electric driven, herringbone coils, late type.
1—50 ton York ice plant electric driven, herringbone coils, late type.
1—14½"x26" 2-cyl. horizontal D.A. DeLaVerne ammonia compressor, direct connected to a 450 h.p. 2200 volts, 3 phase, 60 cycle, Ideal Electric synchronous motor.
1—10"x10" 2 cylinder Frick compressor high speed.
1—9"x9" two cyl. Frick compressor, medium speed.
1—6½"x6½" two cylinder York ammonia compressor, high speed.
1—6"x6" two cylinder Frick ammonia compressor, medium speed.
2—6"x6" two cylinder late model h.s. York compressors.
1—6"x6" two cylinder Voss high speed ammonia compressor.
1—5"x5" two cylinder York high speed ammonia compressor.
2—4"x4" two cylinder York high speed ammonia compressors.
1—3"x3" two cylinder Frick unit, high speed.
York shell and tube condenser 28" dia. x 16' L., 51—2" tubes.
1—25" dia. x 10'0" long 5 pass enclosed type ammonia condenser.
1—16" dia. x 10'0" long 6 pass enclosed type ammonia condensers.
2—Perfection ice scoring machines, 300 lb. blocks.
500—11"x22"x48" ice cans.
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1—35 ton York plant Diesel driven.
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1—16x18 York direct connected to synchronous motor.
1—11x13 York direct connected to synchronous motor.
1—10x10 Frick direct connected to synchronous motor, F.F. lubrication.
1—10x10 Frick medium speed.
1—9x9 Frick 360 r.p.m. F.F. lubrication.
1—7½x7½ York 360 r.p.m F.F. lubrication.
1—7½x7½ York 225 r.p.m.
1—7x7 Frick 360 r.p.m. F.F. lubrication.
1—6½x6½ York 360 r.p.m F.F. Lubrication.
1—6¼x6¼ Baker 360 r.p.m. F.F. lubrication.
1—6x6 York 360 r.p.m. F.F. lubrication.
2—6x6 Yorks 200 r.p.m
1—5x5 York self contained unit 20 h.p. motor.
1—5x5 York 360 r.p.m
1—5x5 Frick 277 r.p.m
2—3x3 or 4x4 York or Frick self-contained units.
2000 feet of 2" pipe coil.
Vertical, horizontal condensers, Brine coolers of all sizes. Brine pumps, valves, fittings, electric motors, air blowers, agitators and msicellaneous equipment. All equipment rebuilt and guaranteed. Send us your requirements.
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All Used Equipment Is Reconditioned in Our Modern Machine Shop

THIS IS ONLY A PARTIAL LIST—WRITE ABOUT ANY REQUIREMENTS WHICH YOU HAVE WE ARE BUYING ADDITIONAL EQUIPMENT ALL OF THE TIME.

Compressors With or Without Motors

Item No.

1—5x5 York, 200 RPM 16
6—6x6 York's, 200 RPM 20
1—6x6 Frick, 257 RPM 21
2—6½x6½ Arctics, 350 RPM, forced feed lub. 30
1—7¼x7¼ Baker, 350 RPM, forced feed lubrication 35
1—7x7 Frick, 200 RPM 40
1—7½x7½ York, 225 RPM 50
1—7½x7½ York, 200 RPM 51
1—8x8 Arctic, 300 RPM. forced feed lub. 60
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1—11x13 York, 164 RPM, forced feed lub. 90
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Diesel Driven and Diesel Engines

1—8x8 York—Direct connected to 50 H.P. Fairbanks-Morse at 257 R.P.M. 210
1—175 H.P. Fairbanks-Morse Diesel engine 211
1—150 H.P. Van Severin—300 R.P.M.—Diesel engine 212

Steam Driven

1—18 ton Vertical 6½x6½ Arctic 321
1—250 ton Horizontal De La Vergne—18x24—with Ames Una Flow engine 325
1—7½x7½ Vertical York, 200 R.P.M. direct connected to steam engine 326
1—8x8 Vertical York, 300 R.P.M. direct connected 327

Pipe

10,000 feet wrought Iron pipe—2"—like new 451

Scoring Machines

2—Giffords wood 512

Item No.

Complete Ice Plants

1—Perfection 513
1—65-ton York plant, 749 cans 629
1—15-ton electric driven plant 630
1—600 Can Trunk Coil Type—York Plant, Brand New Tank. *Complete with 10 Can Grids. This plant is equal to new* 631
Brand New 8 to 10-ton Clear Ice-Making Plants—110 Cans—Electric or Diesel Drive—2 Can Pull 632
3—*247 Can, 22-ton ice plants, like new* 632A
1—15 Ton Diesel Driven Plant 633
1—35-38 ton New Clear Ice Making Plants 635

Self-Contained Units

2—3x3 York & Frick—390 R.P.M. 741
2—4x4 Yorks—390 R.P.M. 742
1—5x5 York—390 R.P.M. 743
1—4½x5 Lipman—360 R.P.M. 744
1—3x3 Worthington 748
1—5x5 Frick—Forced Feed—400 R.P.M. Latest Type 758

Brine Coolers

1—34x12—96—2—Retubed 801
1—34x10—100—2 802
1—48"x16'—130—2" tubes 808

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3—100 ton shell and tube condensers retubed 919
2—Stands—Vogt Multi-tube—Each stand 6 pipes high. Each pipe 9"x18" with 7—2" tubes 920
1—125-ton, Vertical Shell & Tube, 196 2" tubes 921
1—120 ton, 216—2" retubed Vertical Shell & Tube 922
1—50 ton Horizontal—retubed 923
2—20 ton Horizontal—retubed 924

Ice Cans

96—11½"x22½"x46"—Refinished in zinc
400—11½"x22½"x44"—cap refinished in zinc

Ice Cubers

1—100 lb. Uline Automatic Cuber

Motors

1—100 H.P. Westinghouse Motor—V Belt Drive

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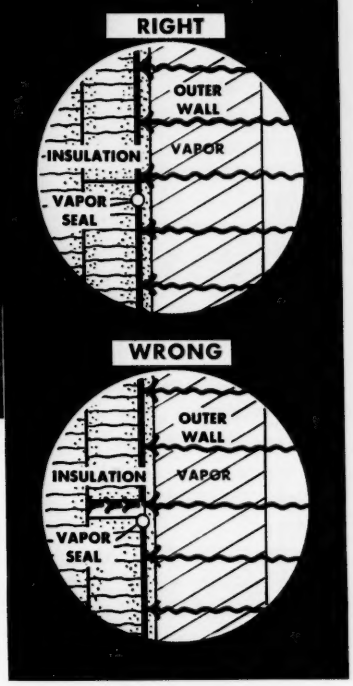

Why Tight Insulation Joints Are Important

EVEN A PINPOINT OPENING IN COLD ROOM CONSTRUCTION IS A DANGER POINT

There's trouble ahead when board-type, low-temperature insulation is not erected with tight joints. The openings may be small and well hidden behind the finish, but each is a channel through which heat and moisture can flow into the insulation—a weak spot in the vapor seal.

The complete vapor seal is made up of asphalt priming paint over portland cement plaster, plus the hot asphalt in which the insulation is dipped before erection. This asphalt is a powerful adhesive, holding the insulation firmly to the wall. It also is a vital part of the vapor seal, supplementing the priming paint. If joints between insulation boards are not tight, gaps also occur in the film of asphalt at these points, and the vapor seal is weakened.

Where the vapor seal is weakened, moisture-laden warm air may eventually work its way in. As that air cools, its moisture condenses and may even freeze in the insulation. Over a period of months or years, this continuous process can ruin insulating efficiency and cause failure of the job.

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FREE BOOKLET

For information on Armstrong's low-temperature insulations and how they should be erected, write today for your copy of "Armstrong's Industrial Insulations." Armstrong Cork Co., 4507 Concord St., Lancaster, Pa.

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Complete Contract Service
For All Temperatures

From 300° Below Zero

To 2800° Fahrenheit

You can cut

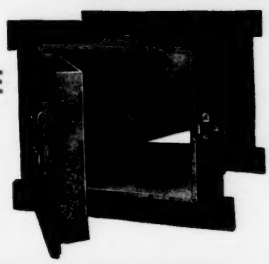
REFRIGERATION COSTS

When Handling

CANS, CRATES, KEGS

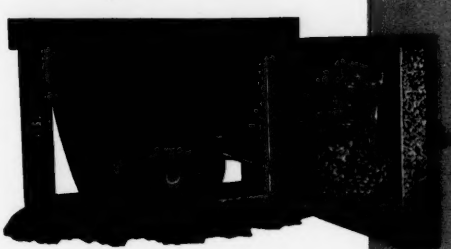
CAN AND CRATE PASSING DOOR

The Auto Close doors swing open readily and close automatically when the cold storage doors open. This checks the inrush of warm air and saves refrigeration. The door can be fitted into a conveyor system or used with its own roller conveyor.



ICE CREAM CAN PASSING VESTIBULE

The vestibule is equipped with a cold storage door at each end. Maximum loss of cold air is limited to the volume of the vestibule because either door is always closed whether loading or unloading. Vestibule holds six to nine cans in various arrangements.



KEG PASSING DOOR

A flexible light weight insulating curtain of moulded material prevents the loss of cold air when the door is open. The movement of the keg lifts the curtain without shock or abrasion as it passes. It immediately drops back in place and air movement is cut off.

These Jamison-Built Doors permit the speedy passing of cans, crates, boxes, packages or kegs in and out of the refrigerated space. Each of the methods illustrated is particularly well suited to the temperatures and type of container. The loss of cold air and the entry of warm air during the time containers are moved in and out of refrigerated storage rooms is held to a minimum. The resulting savings in refrigeration costs can be substantial.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

Standard types of Jamison-Built doors are available for a wide range of temperatures and applications. For special requirements doors can be built to your specification regardless of size, character or duty.

Write for new catalog that gives helpful information on cold storage door selection.

JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MD.

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